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An investigation of the language and psycholinguistic abilities of young adults (age 14-40) evidencing Down's syndrome.

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AN INVESTIGATION OF THE LANGUAGE AND PSYCHOLINGUISTIC ABILITIES OF YOUNG ADULTS (AGE 14-40) EVIDENCING DOWN'S SYNDROME

A Dissertation Presented

By

Judith Rosenberg Conti

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Education

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ABSTRACT

AN INVESTIGATION OF THE LANGUAGE AND PSYCHOLINGUISTIC ABILITIES OF YOUNG ADULTS (AGE 14-40) EVIDENCING DOWN'S SYNDROME (MAY 1986)

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In an attempt to determine if young adults with Down's Syndrome display a characteristic and predictable pattern of language and psycholinguistic abilities, thirty two young adults evidencing the symptoms of Down's syndrome were administered the Illinois Test of Psycholinguistic Abilities and the DiSimoni version of the Token Test. Twenty two of these subjects were also given the Clinical Evaluation of Language Functions. The results of these tests were compared. Statistical analysis of the resulting scores revealed strong similarities in the performance of the subjects on many of the sub-tests.

The ITPA, and CELF sub-tests were ranked according to their order of difficulty. A consistency was noted in the existence of an unusually wide gap that existed

between the highest scored sub-tests and the lowest. An explanation for this was presented in terms of the influence of the curriculum of special education programs on what is practiced and thereby retained in the long term memory of the students. It was noted that there is a strong probability of deficits in the auditory memory systems of all individuals tested. This influences what is attended to when listening to complex speech. Also discussed was the strength of the visual channel when compared with the auditory channel in these subjects.

Twenty four language samples were obtained using both elicited sentence repetition tasks and spontaneous sampling. They were transcribed and analyzed with the aid of a computer assisted language analysis program designed for this study. Both systems of sampling revealed the same general patterns of errors. The majority of errors found were the omissions of pronouns, conjunctions, and words of exclusion. A comparison of the subjects' language and the language of the average six year old, revealed reasons for conflict with the theory that is often repeated in the literature, i.e. that all language develops according to normal sequences. The research demonstrated that there are definite patterns of psycholinguistic and

language abilities in young adults with Down's syndrome. These characteristics are recognizable and predictable. Suggestions were made for the remediation of potential deficits to be implemented immediately upon the identification of a child with Down's syndrome in order to prevent their predictable occurrence.

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I N T R O D U C T I O N

This thesis investigates young adults with Down's syndrome to determine if they display a characteristic and predictable pattern of language and psycholinguistic abilities.

Rationale

I initiated this project because my observations were that individuals who displayed the physical characteristics of Down's syndrome shared characteristics of language that differed from those of other mentally retarded individuals.

While employed as a speech and language pathologist, I tested a number of clients utilizing a variety of formal language tests. Based on the resulting composite score sheets of the tests, I discovered that I could recognize what appeared to be a "Down's profile" from the pattern of high and low score results displayed on the summary graphs. Further testing of additional adolescent clients evidencing Down's syndrome yielded similar results.

A search of the literature revealed the existence of

reports suggesting some similarities in cognitive processing and psycholinguistic abilities among the Down's syndrome group. Because the reports were few in number and scattered in a variety of journals and books, this information concerning these similarities has not received much attention from educators in special needs programs. Indeed there has been minimal reference or consideration of specific linguistic deficits or strengths of the Down's syndrome group in the development and application of published materials used to remediate the language deficits of this unique population.

Because of medical advances and legal decisions, the life span of the individual with Down's syndrome has increased and there have been positive changes in social attitudes towards this group. Recent studies in linguistics and psycholinguistics have provided us with new understandings concerning language, as well as new intervention techniques for stimulating and remediating language.

Since these changes have occurred during the past 15 to 20 years, there exists today a group of young adults who have never been institutionalized and who have never received appropriate language therapy. They still display language patterns that might be considered as being unaffected by speech and language remediation. The

mature language patterns of this group should be investigated now in order to discover if patterns of strengths and weakness can be identified that are characteristic of the group. If such patterns do exist, their presence and identification can be utilized in ways that will enable therapists and teachers to more appropriately design and implement intervention programs for infants born today with this syndrome.

Federal law 94-142 mandates that all special needs children should be provided with an "appropriate education". Although therapists and special educators have been charged with the responsibility of formulating IEP's (individual educational plans) for the Down's Syndrome group, these plans have generally been designed without completely utilizing all the information and knowledge which exists that could enable us to provide optimum remediation.

CHAPTER 1

BACKGROUND OF STUDY

Down's syndrome can be traced in the medical literature only as far back as 1828 when Esquirol described a child presumed to have this syndrome. In 1844, Emile Sequin described a patient with similar features calling it "furfuraceous idiocy". In 1866, John Langdon Down published a paper in which he described the characteristics of the syndrome that subsequently was named for him:

> The hair is not black as in the real mongol but of a brownish color, straight and scanty. The face is flat and broad. The eyes are obliquely placed. The nose is small. These children have considerable power of imitation. Pueschel, 1978, p.13).

Because of Down's contribution this condition was seen as a distinct and separate entity which could be identified by the recognition of physical characteristics. Down believed this condition to be a reversion to a more primitive racial type and used the term "Mongolism"; thus the description "mongolian idiocy" came to be used. It was not until the mid 1950's that studies revealed that human chromosomes were responsible for this condition. In 1959, Jerome Lejeune discovered

that the individual with Down's syndrome had one extra small chromosome, derived from either the egg or the sperm, that did not separate properly during cell division. Instead of the usual two #21 chromosomes, there were three #21 chromosomes. This discovery led to the term "Trisomy 21", to describe the condition; approximately 95% of the people who have Down's syndrome are of this type. It was subsequently discovered that in addition to Trisomy 21, there were two other chromosomal conditions clinically associated with Down's syndrome, namely mosaicism and translocation. In three or four percent of the cases the additional #21 chromosome is attached or translocated to another chromosome. In the remaining one percent of Down's syndrome individuals there is an error in cell division soon after conception which results in some cells having 46 chromosomes whereas others have 47. This is described as mosaicism. Down's syndrome occurs in approximately one out of every 600 to 1,000 live births.

The literature reveals attempts to classify abilities and characteristics of these three types of Down's syndrome individuals. Rosecrans (1978) found "individuals with Down's syndrome comparatively high in ability are far more often to be cases of mosaicism than can be expected by chance". Johnson and Ableson (1969)

examined institutionalized adults to discover if they could "discern a differential pattern of stigmata for any one type as compared with the other two." They concluded from their data that it was impossible to predict any pattern. They also reported that, contrary to other research, cases of translocation were highest in ability, with people karyotyped as trisomies next and mosaics last. They concluded that perhaps mosaic types show the highest degree of variation in their abilities. (Their study was by questionnaire to institutions in the western states only).

John Langdon Down's brief description now can be expanded to include a more accurate and complete description of the physical features which can be noted in persons with Down's syndrome. The head is often flattened, and their hair is silky and sparse. The face appears somewhat flattened due to the underdeveloped nasal bone. The eyes may be slightly slanted upward and spaced apart, and small skin folds at the inner corners of the eyes may be present. The ears are usually somewhat smaller than those of normal children and the helix is often folded over. The inner ear canal is narrowed, leading to the likelihood of middle ear infections and fluid accumulation. The mouth is often held open with the tongue protruding. In the adult, the

tongue becomes deeply furrowed. The inside of the mouth is small with a narrow palate; some of the teeth may be missing, and those present may be abnormally shaped. The neck might appear short; in the newborn there is often an excess of skin at the back of the neck. The hands and feet are small and stubby, and the fingerprints are often different from those of the normal child. In nearly 50 percent of the children a single crease across the palm is observed on one or both hands; a skin fold between the fingers and toes is often present. The first and second toes are spaced widely apart with a crease running between them on the sole of the foot. The children are double-jointed and their muscle strength and muscle tone is usually reduced. About thirty to forty percent of the children with Down's syndrome have heart problems; other congenital defects may also be present in the child (Pueschel 1978).

Human physical development has been scaled in infants to provide a means of comparisons between growth rates and development. It is generally accepted that the physical growth rate of the Down's syndrome child is slower than in the normally developing child. McIntire, Menolasscino, and Wiley (1965) studied 86 Down's syndrome children under the age of three years. The children were examined individually by specialists and physicians and

their mothers were interviewed. The most frequently mentioned characteristic of the children by physicians was hypotonia which was listed for all but two. The incidence of psychiatric disorders was high (12.8 percent). The incidence of seizure (5 percent) was higher than would normally be anticipated in the general population. Five showed a hearing loss, whereas the majority showed a delay in speech and language development. Eighteen percent of the infants were judged premature at birth. Almost one half of the mothers described complications of pregnancy. Forty percent of the mothers described the infancy of their children as a "good" or "limp" baby. All children exhibited some degree of mental retardation. The most frequent judgment of the degree of retardation was "moderate".

Some early investigations of language development utilized the language of the Down's syndrome individual because of the belief that their slowed development replicated the language development of normal children. According to Lenneberg, Nichols and Rosenberger (1964):

> ... in this presentation we should like to demonstrate how language development in mongoloid children may well tell us something about the biological prerequisite for language. As a general rule it appears that strictly biological functions manifest less retardation than those conditioned by cultural learning. Thus mongolism may be regarded as a prism through which human behavior is refracted

and spread out before us.(p.119)

If this is true, it should have also been assumed that adult speech samples and test results would replicate those of the normal child at a younger age. It then was necessary to investigate certain aspects of language as utilized by young adults evidencing Down's syndrome and to compare them with a group of children of comparable language ages and mean length of utterance (MLU). No studies of this sort have been reported in the literature.

Benjamin Kramer's introductory remarks at an all day symposium on Mongolism in New York City included the following statement; "the average life expectancy of the mongoloid child is about 10 years." (1953, p.78). At that same conference, Strazzula, a speech therapist, argued for allowing more Down's syndrome children into speech therapy:

> Schools, community services, private agencies, and medical centers tend to underestimate the progress that can be made with these children. It has been almost impossible to place a mongoloid child in the speech clinics of any of the colleges or hospitals in the city. Some will accept one or two retarded children, but this quota is quickly filled. (p.272).

In recent years there has been a substantial increase in the life expectancy of the Down's syndrome children since they are now treated more effectively for

respiratory ailments, heart defects, and other medical problems (Pueschel 1978). There has also been a shift in social and community awareness and acceptance of handicapped individuals. No longer is the Down's syndrome child automatically institutionalized. Supervised community group homes for adults and adolescents are now replacing institutions. Pre-vocational training has been introduced in schools to teach youngsters good work habits and interpersonal relationships. The focus is upon enabling the individual to become as well adjusted and self reliant as possible in order to provide them with a feeling of self worth, and to encourage them to make a contribution to society. Current social trends are increasingly supportive of the families who are rearing handicapped youngsters. While children with Down's syndrome show delay in their biological functioning, we do know that they make progress in their overall development. Specialized teaching and early intervention programs have been developed to help parents and their youngsters to function more normally.

In 1975, P.L. 94-142 (the Education for all Handicapped Children Act) was passed. This federal law mandated that all handicapped children be guaranteed the right to a free, appropriate education commensurate with

their abilities.

> All children who qualify for specialized instruction under this act will have individualized educational plans developed by local educators. Hopefully the development of these instructional programs will focus upon individual and situationally-specific assessments. (Gillepsie-Silver, 1978, p.30)

These specific assessments and their resulting plans are the concern of this investigator. In order to develop these educational plans, it is necessary to perform diagnostic evaluations which reveal both the strengths and the weaknesses of the individual child. If there are specific abilities which exist that are common to the Down's syndrome individual these should be identified and utilized as a tool to help design the learning environment for the child. The child is both a product and a causative agent of their environment. The child responds to the environment, and the environment, in turn, changes in response to the child's reactions. With this in mind, it is essential to provide an appropriate learning environment as early as possible for the disabled child. We must be aware of the potential problems, as well as opportunities, and factors that can be utilized to serve as a foundation upon which to build and support remediation programs.

The majority of current diagnostic language tests

that are capable of revealing detailed information about linguistic processes cannot be administered until a language age of at least three is reached. It is now clear that language development in the Down's syndrome individual is delayed. Fraser (1979, p.106) found that "the average age at which these children start to use words is 30 months, and most can use phrases by five years". Often, diagnostic language evaluation cannot be undertaken until a very advanced chronological age. This results in valuable years being wasted during which specific remediation might be ongoing.

> The complex act of processing auditory language can be subdivided into three levels: the perception of the sensory data; linguistic processing of the phonological, morphological, syntactic structure, and semantic aspects; and cognitive processing...efficient processing of auditory language occurs simultaneously at all levels and it places demands upon auditory attention, short-and long-term memory, feedback, and evaluation. (Wiig and Semel, 1976, p.43).

If one considers the interrelationships between the processes of language acquisition and performance, it becomes apparent that the deficits in some psycholinguistic abilities might be a contributing factor to delayed language acquisition.

Speech therapy in the past has focused upon the remediation of articulation and voice problems of the Down's syndrome child. Only recently has language

therapy focused upon morphology, semantics, and syntax; it also has become an integral part of preschool training. Today the young adult with Down's syndrome has been involved in limited, if any, language therapy. Thus, these individuals can serve as excellent sources for the investigation of the existence of mature language characteristics of the syndrome.

Significance

Should special characteristics of language and psycholinguistic abilities that are typical of the Down's syndrome individual exist, then it is my view that they can be identified and revealed.

We will be able to structure the environment of the young children displaying this syndrome in ways that will enhance their ability to overcome potential difficulties at a young enough age to be optimally beneficial for their language acquisition. IEP's developed specifically to overcome known potential difficulties could be developed for each child, with an awareness of which processes can be capitalized upon, and which to remediate.

Attention has recently been paid by Stoneman, Brody, and Abbott (1983); Guttman, and Rondal (1983) to

interactions between parents and their Down's syndrome infants. Other studies have reported that mothers can be trained to provide language enhancement therapy in their home environment : Salzberg and Villani; (1983); Cheseldine, and McConkey (1983). Information of the sort gathered by these researchers is essential to structuring an optimal learning environment. More success might be seen if we knew specifically what would enhance the acquisition of other skills in these children. It is for these reasons that I have chosen to examine the following question: Do young adults with Down's syndrome display a characteristic and predictable pattern of language and psycholinguistic abilities?

Assumptions and Limitations

In an attempt to discover if auditory memory skills of Down's syndrome individuals are truly inferior to their visual memory skills, Marcell and Armstrong (1981) devised experiments using material similar to that of the ITPA. They altered their mode of presentation so that visual and auditory tasks were equated in complexity of presentation, instructions, and mode of response. They found that the Down's syndrome children had more difficulty remembering verbal-auditory material. They

indicated that, in their opinion, the nature of the deficit was a general one and was not caused by the sequential nature of the task. In 1971, Semmel and Dooley examined the comprehension and imitation of sentences by Down's syndrome children. They reported that the Down's syndrome children comprehended simple negative sentences as if they were "affirmative declarative strings". They concluded that:

> Children with Down's syndrome may lack the competence to process a negative sentence into an underlying kernel plus semantic transformation. They may instead extract a kernel-like structure, similar to that of the sentences they normally hear, which exhibits a relationship of agent to recipient opposite to that in the base string underlying the negative sentence....on the other hand these children may have the competence to deal with negative sentences, but may fail to attend to the negative marker in the surface structure and thus treat the sentence as if it were an affirmative string. (1971, p.744).

McDade and Adler (1980) assessed Down's syndrome subjects' abilities in recall, verbal recognition, and nonverbal recognition. They concluded that performance was poorer on auditory recall testing for the Down's syndrome group than for matched MA control groups. They also found that this group appeared to show a retrieval deficit for auditorially presented unrelated words. Bilovsky and Share (1965) and McCarthy (1965) studied score results of the ITPA testing of Down's syndrome

children. Their data indicate that Down's syndrome subjects possess deficits in their scores on ITPA sub-tests that purport to evaluate their auditory and visual memory abilities, and strengths in the sub-tests that evaluate motor expressive skills. Marcell and Armstrong (1982,p.195) propose that deficits might be due to a more rapid decay in the echoic memory of the Down's syndrome individual; or that they might be slower to identify and to respond to incoming items and, "thus cannot efficiently use the auditory information contained in echoic memory". In 1971 Mackay and McDonald experimented with digit span messages given to Down's syndrome subjects utilizing structure and redundancy in the messages. They concluded that "when mongols perceive structure in learning tasks they are equal to non-mongols in using it to advantage. But when they do not perceive structure, learning is significantly impaired." (1976,p.195).

In a pilot study by this author, twelve Down's syndrome young adults were administered the Illinois Test of Psycholinguistic Abilities (ITPA) developed by Samuel Kirk, James McCarthy, and Winifred Kirk; the Clinical Evaluation of Language Functions (CELF) by Elizabeth Wiig and Eleanor Semel; and the Token Test for Children by Frank DiSimoni. The comparison of their scores and the

ranking of difficulty of sub-tests in these batteries indicated a consistency among all subjects. The test scores demonstrated that those tests which assessed manual and repetitive skills were simplest for the students with Down's syndrome. Those tests which assessed short term storage and retrieval abilities were consistently more difficult for the group. These findings are in agreement with those researchers previously cited. Based upon these investigations the following assumptions are being made:

1. That there is a consistency amongst individuals with Down's syndrome in their performance on tests of language and psycholinguistic abilities.

2. That on tests measuring manual and repetitive skills, their test scores will be highest.

3. That on tests which assess short term storage and retrieval abilities, their scores will be lowest.

Limitations

1. All published tests have both supporters and critics. The ITPA has been in use since 1965. Since its development and publication much has been learned about psycholinguistic abilities. Many articles have been written in criticism of the ITPA including those by Hare,

Hammill, and Bartell (1973), Ryckman and Weigerink (1973), and Prutting (1979). Although the CELF has been in use since 1980, only recently have critiques been published, (Muma,1984; and Spekman, 1984). The validity and normalization of the Token Test has also been questioned, (Werz,1979). The fact remains that these test batteries are presently among the few widely known tests that can be utilized to examine separate aspects of language, evaluate them, and enable comparisons with established norms to be made at as early a language age as three years, or as advanced an age as twelve years.

No attempt has been made by me to critique these tests. A review and summary of the published findings of other investigators will be included.

2. No attempt has been made during this study to karyotype the individuals tested. The identification of an individual as "Down's syndrome" on school or medical records will be accepted as sufficient evidence.

3. No attempt has been made to generalize this study to other populations. The focus shall be to establish if there is a predictable pattern of language and psycholinguistic abilities associated with Down's syndrome.

4. In this study, young adults have been defined as being between the chronological ages of 14 and 40 years.

Study Design

The design of this study is similar to that of the pilot study carried out by the author and reported in the previous section. The same battery of tests was administered to each subject in a manner conforming to the administration procedures outlined in each test manual. The CELF manual does not specify or restrict administration sessions; it was administered in two sessions. Attempts were made to minimize reinforcement, however the importance of encouragement to this population must be recognized and considered. Conscientious efforts were made to insure that interference with test objectives did not occur. Documentation of reinforcement techniques was maintained. All tests were administered under as "ideal" conditions as possible. A record of the test environment was documented. The sequence of testing was consistent for all subjects.

Subjects

The following criteria were used in subject selection:

1. They were between the chronological ages of 12 and 40 years.

2. They were able to demonstrate the ability to hear without the use of amplification. Audiological records were referred to when available.

3. They never had been institutionalized.

4. They had a language age of at least three years as determined by their scores on the ITPA.

5. No consideration was given to gender.

Instruments

The Illinois Test of Psycholinguistic Abilities developed by Samuel Kirk, James McCarthy, and Winifred Kirk (1965) was administered as described above. Scoring was accomplished as stated in the instruction manual. The mean score, and the standard deviation for each subject was computed thus allowing each to serve as their own control. Psycholinguistic composite age was computed for each subject. The overall pattern of deviation was plotted in order to make individual comparisons as well as to determine group strengths and weakness. Individual sub-tests were ranked according to order of difficulty. Statistical analysis in the form of paired t tests and Pearson Correlation Coefficients were calculated. The Token Test by Frank DiSimoni (1972) was administered and scored according to standardized procedures. The total score for each subject was determined and compared with norms. Individual sub-test scores for each individual

were compared with norms. The Clinical Evaluation of Language Functions (CELF) by Elizabeth Wiig and Eleanor Semel (1979) was administered and scored as described in the directions. Language age scores, and pass/fail criteria were calculated for each subject. Whenever possible percentile scores as determined in CELF Update III were also determined. Production language ages were compared with processing language age scores for each subject. Average production age scores of the group were computed as well as average processing language age scores. This permitted individuals to be compared and group performances to be noted. CELF sub-test ranking of difficulty was determined and graphed. Paired t tests and Pearson Correlation coefficients were calculated on sub-test scores.

In order to accurately examine each subject's spontaneous novel use of language, a language sample was obtained individually from each subject according to the methods described in Language Sampling, Analysis, and Training by Dorothy Tyack and Robert Gottsleben (1977). Each sample was recorded on an inconspicuous portable cassette tape recorder using a microphone. The samples were transcribed as soon as possible after taping to increase the accuracy of the transcription. A language analysis was performed on each language sample in order

to: determine word tally, assign a linguistic level according to the mean length of utterance (MLU), categorize the sentence constructions, and determine instances of accurate usage, of inaccurate usage, or omission of grammatical forms. This permitted the determination and analysis of consistencies of language patterns (if present) for both as groups and individuals.

This same analysis was performed on the first 15 sentences of the Model sentences sub-test of the CELF.

CHAPTER II

REVIEW OF THE LITERATURE

A review of the literature concerning the language of young adults with Down's syndrome brings to light information concerning their specific language abilities, insight into the prevalent attitudes towards this population, as well as a review of the development of knowledge concerning their language. By surveying over 40 years of research devoted to linguistic aspects of Down's syndrome individuals, one is confronted by the paucity of specific information concerning these young adults. There is also a lack of well founded, methodologically sound research which is useful to today's speech and language therapist for the purpose of planning intervention techniques for this population. A large number of articles can be traced back to overgeneralizations and poorly designed research.

It is critical to identify that information which is accurate and well founded so that appropriate conclusions can be drawn. This is necessary for planning relevant language intervention techniques that can be implemented at a sufficiently early age to benfit

children afflicted by Down's syndrome. We can no longer wait until a child's language can be analyzed to begin remediation techniques. With Down's syndrome individuals, in depth language testing cannot be performed until a well advanced age. Waiting this long wastes valuable learning years which can never be recovered.

The articles published in the 1940's regularly use words such as "moron, feeble minded, idiot, mentally defective," as identifying labels for the developmentally delayed population. On first encountering these terms it is difficult to read these articles objectively since these labels have such strong emotional overtones and negative connotations connected with them. It is only after reading other articles in the journals that one becomes accustomed to what the attitudes were concerning this population not so very long ago. Sterilization issues, lobotomies, and problems of humane treatment were the issues of these years. The types of studies of Down's syndrome as a distinctive category of mentally retarded individuals, were revealed in an article by George Jervis; "Recent Progress in the Study of Mental Deficiency-Mongolism: Review of the Last Decade." (1941). This article described the incidence, signs and symptoms, pathology

of the brain and endocrine system, laboratory findings concerning blood (increased leucocyte levels), and basal metabolism. No mention of speech or language was incorporated. Of particular interest however, was his summary of the "current" views of etiology. Battistini postulated that the smallness of the amniotic sac might be the cause; Lenz and Stoeltzner blamed contraceptive methods; Clark believed the syndrome to be caused by endocrine secretions; Bleyer blamed reduced maternal fecundity" (due to the observation that the mean age of mothers producing babies with Down's syndrome was 41 years). The theory that mongolism was a reversion to a more primitive race was being questioned at that time due to the discovery of mongolism in black babies.

In 1945, another literature review was written by Beidleman; "A Selective Review". In this article, birth history, incidence, physical, mental, and nervous characteristics, were described. Of particular interest in this article was the following statement:

> The mongoloid baby is usually silent and neither gurgles nor coos. Later its voice may appear harsh with faulty articulation due to congenital defects and/or poor coordination. The child next begins to imitate without understanding. Purposeful speech usually doesn't evolve until from 3 to 5 years. (p.38).

No specific references for these contentions were provided making it impossible to discover if this statement was opinion, observation, or the result of experimentation.

Anderson Aldrich, M.D., addressed a meeting of the AAMD several years later. His paper "Preventive Medicine and Mongolism" included this statement:

> From the standpoint of the baby the following points should be mentioned. The mortality rate in the first two years of life is high because of the inferior musculature of these children. Infections of the respiratory tract are particularly dangerous and congenital heart disease is very common and a frequent cause of death. From the standpoint of the child's living an adequate social life the prognosis is even worse. I have often remarked that the better they were, the worse off they were. (1947, p.129).

He described the frustrations encountered by children due to their inability to compete, and supported the popular opinion of the time: "nevertheless, they are happiest when allowed to grow up in situations where they compete with their peers, in institutions." This article outlined the steps he suggested to "lead" families to the decision to institutionalize their child.

> This method is not infallible, but in the past 15 years it has failed me only two or three times. It means that the physician must take the lead in precipitating an immediate crisis to prevent much more serious difficulties later on. This is preventative

medicine. (1947, p.129).

Ellis and Beechley wrote "A Comparison of Matched Groups of Mongoloid and Non-Mongoloid Feebleminded Children" (1950). Their comparison of 40 children matched for sex, age and I.Q., allowed the following conclusions to be made: Mongoloid's were; "distinctly" less emotionally disturbed, more often Catholic than Protestant, more often from broken homes; more often born last in their families; more often from older fathers; more often from older mothers, and more often from parents of greater intellect. It should be noted that the children studied were patients of the Northern New Jersey Mental Hygiene Clinic; none were institutionalized.

Because of the limited sampling, this research must be viewed as not representative of the total population of Down's syndrome people. In 1953, a conference on Mongolism was held in New York and several noteworthy addresses were given. Wilfred Quaytman questioned the pediatrician's "wholesale recommendation of institutionalization of children diagnosed as mongoloid as birth". He noted that nearly all data published were the result of studies of institutionalized Mongoloids (who then represented only 10-20 percent of the total

population). He compared children between 2 years and 10 years with institutionalized groups, and suggested that "the mongoloid child living in the community who has the benefit of parental affection and special care progresses mentally at a significantly faster rate than institutionalized mongoloids". (1953,p.265).

At that same conference, Benjamin Kramer related that the average life expectancy of the mongoloid child was 10 years. Millicent Strazzula, a speech therapist at the Jewish Hospital of Brooklyn, reported that her study of 40 mongoloid children indicated that: "non-institutionalized mongoloids develop more adequate speech". Her specific comments were that:

> The ament is characterized by his inability to abstract. This perhaps explains the limited vocabulary and confused grammatical structure of the mongoloid. Comprehension is usually superior to expressive language.....";

No documentation to support this statement was included. No mention was made of the procedures utilized to substantiate this statement. Strazzula's study included 17 mongoloid children who were involved in a "once a week program of speech therapy for not more than a year." At the conclusion of the year, the therapist judged 1 child to have made no progress, 4 children to have made fair progress, 10 as good, and 2 as excellent. Fifteen other mongoloid children served as a control

group. Of these, 7 made no speech progress during the year, 6 showed fair improvement, and 2 were rated as having made good progress. No reliability studies were mentioned, nor were criteria for "improvement" given. Her subjects included Down's syndrome children with little or no speech, articulation problems, and hearing and aphasic difficulties. No specific breakdown or matching of subjects was mentioned. Although it is impossible not to identify with the sentiments of her study and the plea to include mongoloid children in speech therapy clinics because they are not hopeless and do make progress, one must also be aware that the actual documentation and methodology of this paper were poor.(1953, p.270). The paper was one which was referred to in many later articles as providing evidence of speech/language improvement in the Down's syndrome population.

Louis Rosenzweig reviewed the literature of mongoloidism in "School Training of the Mongoloid Child," (1953). He found that there was a need for "intensive study concerning the education of the mongoloid child." He questioned the hypothesis that mongoloids possess mental traits similar to other mental deficients of equal mental deficit, a view that persisted at that time in the literature. "What is

found is the ready acceptance of the observations or conclusions of one or two authorities and its repetition until it has the force of truth".

Benda was quoted as stating; "if the mongol child is in an environment of speech, so that speech becomes an integral part of his social intercourse, attention and importance, he will talk, for a mongol will imitate that which goes on around him. The therapeutic procedure is through over-dramatization of the speech situation, and exaggerated intonations". (1953, p.286). Benda's book has since been revised making it impossible to find documentation for this statement. The most recent edition (1969) of the book no longer includes this remark.

Stanley Goertzman wrote "Speech and the Mentally Retarded." Included in this article was one paragraph about the mongoloid child:

> "Benda says that it is not possible to generalize on the language and speech development of the mongoloid child since variation in environment may have differing effects on the growth of vocabulary. One may characterize their vocabulary as limited and slow to develop as speech is often delayed several years. Usually pronunciation and articulation are clumsy and difficult to understand. Defects associated with mental deficiency are present, i.e., muscular flabbiness, and structural anomalies of the articulation and hearing mechanism. The voice is hoarse with no modulation of pitch intensity. (1957, p.249).

The only other pertinent literature that same year was contributed by Wunsch; "Some Characteristics of Mongoloids Evaluated in a Clinic for Children with Retarded Development". He described behavior, maternal age, birth order, father's occupation, family size, mental status, but made no mention of speech or language development.

Blessing (1959) sent opinionaires to 23 teachers of trainable classes. His article; "The Middle Range Mongoloid in Trainable Classes", indicated that thirty six percent of the youngsters enrolled in trainable classes were classified as mongoloid. He asked their teachers which problems and satisfactions were most often associated with these children. After categorizing the results, he found the most frequently mentioned "satisfactions" included amenable, gay, happy, obedient, and independent. The least frequent "satisfactions" were: good communication, good motor ability, orderly, and special talents. Problems most frequently cited included: short attention span, poor communication, stubborn, attention seeker, and tires easily. Naturally, a questionnaire is answered only by those who choose to respond, and the presence of a check list provides "descriptive words" that otherwise might

not be the ones of choice by the respondents. The conclusions of this study served to stereotype Down's syndrome children.

McIntire, Menolasscino and Wiley (1965) reviewed the examinations of 86 infants (under two years of age) in their article "Mongolism-Some Clinical Aspects", and concluded that the most frequently mentioned characteristic of these mongoloid children was generalized hypotonia, a condition listed by the examining physician in all but two cases. The incidence of psychiatric disorder was high, 12.8 percent. Five of the children showed hearing loss whereas the great majority showed a delay in speech and language development. During that same year, other aspects of Down's syndrome investigated included articles describing: Uric Acid Metabolism, Elevated Level of Several Nitrogenous Nonprotein Metabolites, Personality Traits, Relationship of Physical Stigmata to Intellectual Subnormality, Biochemical Studies in Mongolism, Liver Function and Hepatitis, Serum Potentials, Effects of Home Care.

Bilovsky and Share, administered the ITPA (original version with 9 sub-tests) to 24 non-institutionalized subjects and published "The ITPA and Down's Syndrome: An Exploratory Study" in 1965. Their study "attempts to

assess the cognitive patterns of the Down's Syndrome child." Subject ages ranged between 6 years, eleven months and twenty three years, six months. The subjects showed the greatest mean deviation (14 months average) below their language age norms on visual motor sequencing, and on auditory vocal sequencing. Their greatest deviation above their means occurred on motor encoding (21.8 months).

When viewed as a group the subjects of the study show certain psycholinguistic deficits and strengths as revealed by the ITPA. The primary deficits of the Down's Syndrome group were in the auditory-vocal levels. Their primary strengths were in the motor encoding and visual decoding channels at the representational level. The authors concluded their article by encouraging the use of the ITPA as a basis for the development of educational and remedial programs for the Down's Syndrome group.(1962, p.81).

A 1965 study by Lenneberg, Nichols and Rosenberger, "Primitive Stages of Language Development in Mongolism" was one which for many years was referred to in articles concerning language development in Down's syndrome children. It was considered a "landmark article" and for this reason it must be carefully studied. The hypothesis of the study was that language development in

mongoloid children "may tell us something about the biological prerequisites for language". Sixty one children living at home, between the ages of 3 years and 22 years were evaluated over a three year period. The younger children were seen more frequently than the older, and the average number of examinations was 2.5 per child. A strong correlation was found between achieving motor milestones and the onset of language. "Children who were still creeping were also still babbling. Once gait is firmly established and coordination is good enough for running, almost three times as many children are done with random babbling and on the road toward verbal communication". The conclusions made were: "the child is unable to use the social stimuli capable of serving as models for language before a certain degree of maturation". This was further generalized to: "Mother's efforts to teach him to say words before he can stand are of no avail, but when he is mature enough to run, he is also mature enough to begin to learn many different words."(p.123). The next section of the paper was devoted to an excellent description of language development.

It should be noted that at this time new theories concerning language were being reported. Linguistics, psycholinguistics, and cognitive psychology were

emerging fields. Speech pathologists until then had been concentrating upon the remediation of stuttering, articulation, and voice problems.

The researchers then described an experiment in which they attempted to discover if mongoloid children's use of syntax follows the rules of normal language development. The language of Down's syndrome children's was used as being representative of the language of retarded children in general.

Thirteen subjects were given sentence repetition tasks involving the auxiliary verb in a variety of constructions. Seven subjects were consistent in their inability to repeat the sentences correctly. Two children consistently repeated all sentences. Four were described as being in transitional stages since they were able to repeat some sentences and not others. On the basis of this evidence the conclusion that the children showed "a surprisingly orderly progress of success from rule to rule" was drawn. The limited sample size should be noted, as well as the concept of transitional stages of the four children who were able to repeat some sentences. The presentation techniques were not documented, nor were any of the responses. Sentence repetition tasks at that time were believed to represent the child's grammatical knowledge.

Slobin and Welsh (1971), and Menyuk (1963), supported their use of this type of task. Tests such as the Vane Evaluation of Language Scale, (Vane, 1975), The Oral Language Sentence Imitation Diagnostic Inventory, (OLSIDI), (Zachman, Huisingh, Jorgensen, and Barrett, 1975), The Environmental Language Inventory (ELI) (MacDonald 1978), and the Carrow Elicited Language Inventory (CELI), (Carrow, 1974), were designed using this format to measure children's grammatical performance. In later years it has been found that sentence repetition may not measure a child's actual grammatical competence (Kuczaj and Maratsos, 1975). It has been suggested that these tests be used only as a guideline which is then supplemented by spontaneous speech samples. Speech pathologists were then just beginning to utilize theories of language development in therapy. Remediation programs were published specifically for the remediation of language deficits. The development of Kirk's ITPA, a test which attempted to separate language into levels (a representational and automatic model) allowed language to be examined as an interrelated phenomenon. Studies concerning separate aspects of language began to be seen in journal reports.

Fishler, Share, and Koch wrote; "An Adaptation of Gesell Developmental Scales for Evaluation of

Development in Children with Down's syndrome; Mongolism". This was the initial usage of the term Down's syndrome as a substitution for the term mongolism. The authors suggested that "the area of slowest progress is language, with Down's syndrome population lagging by more than one half in comparison to normal children" (1964, p.644). That same year, Shotwell and Shipe assessed 42 mongoloid children's social and intellectual level, prior to admission, upon admission, and 18 months after admission to a state hospital for the retarded (using the Vineland Social Maturity Scale and the Stanford Binet test). They compared 25 home reared children with others who had been placed in private boarding facilities, and reported that their findings supported their hypothesis that home reared children would be intellectually and socially superior to children institutionalized at birth and that the superiority would persist.

Nakamura (1965) analyzed the items that were passed on the Stanford Binet Intelligence Test by matched Down's and non-Down"s institutionalized adults. The Down's group excelled on those items requiring a motor response to visual stimuli, and the non-Down's group excelled on the ones which required a vocal response to auditory stimuli.

That same year Jean McCarthy compared performances on the ITPA of 30 Down's syndrome children with 30 non-Down's syndrome children of matched chronological age (between 5-15 years), and mental age (mean of 49 months). Their scores revealed that; "marked differences between these groups appeared on the motor encoding sub-test where the mongoloids were superior, and that inferior abilities existed on the automatic-sequential level when compared with abilities at the representational level" (1965, p.93). The version of the ITPA used was the original version, so that sub-tests were slightly different from those being used currently.

In 1965, Otfried Spreen wrote a two part review: "Language Functions in Mental Retardation". The first section was a review of the relationship between thought and language. It was noted that only inconsistent results were reported in comparisons between the mongoloid and non-mongoloid language studies. Higher rates of speech defects were found in the mongoloids, with 95% displaying articulation defects. Voice defects had been found in 72 percent, and speech blocks and cluttering type errors were also common.

Crome, Cowie and Slater (1966) suspected that hypotonia may be the cause of poor kinesthetic-motor

abilities and may be caused by an organic dysfunction or defect. They reported that the weight of the brain-stem and cerebellum in the Down's children was only 75 percent of the weight for normal children of the same weight and height.

Margaret Scheffelin (1967) examined learning patterns of the Down's syndrome children in her doctoral dissertation "Comparison of Four Stimulus-response Modalities in Paired Associate Learning With Down's Syndrome Children". She concluded from her study of 24 Down's syndrome children (mean age 11 years), that they "gain and retain information more through the visual sense than through the auditory sense, especially when a vocal response is required." (p.45). Agreement with this conclusion can be traced back to the reports of the superiority of the visual mode over the auditory mode for Down's syndrome children, by Nakamura (1965), McCarthy (1965), Bilovsky and Share (1962), and Scheffelin (1967). A review of the literature by Zisk and Bailer in JSHD, reveals repeated attempts by the researchers to investigate the language difficulties of mongoloids. Until that time the majority of efforts had been directed towards counted and categorized speech deficits.

Zisk and Bailer described these efforts as follows:

> The conclusions that the mongoloid child is unresponsive to speech therapy were based upon clinical observations rather than on controlled investigations; and no attempts were made by the investigators to create new techniques for dealing with speech problems specific to the mongoloid child".(1967, p.228).

Ellis and Anders investigated "Short Term Memory in the Mental Retardate". Here was an attempt to examine components of intelligence and language. They matched retarded and non-retarded subjects by chronological age and tested specific memory tasks. They concluded that it was neither short term nor long term memory that was the cause of poor performance, but a "lack of learning influenced lack of recall" (1968, p.935). That same year Sheehan, Martyn, and Kilburn, in "Speech Disorders in Retardation" claimed that "speech development is an aspect of total intellectual development and a reasonably good rough indicator of degree of retardation."(1968, p.256.). Their data was collected from 216 patients in a state hospital for the retarded. Cornwall and Birch in 1969 examined the "Psychological and Social Development in Home Reared Children with Down's Syndrome." Severe limitations in both language and conceptualization were noted throughout their study. Their data indicated that "in Down's Syndrome there is both a developmental lag and an arrest of certain psychological and social

capabilities." However, performance was not as homogeneous as might be expected. No evidence supported previous reports of stereotype for Down's syndrome children. The children were "severely limited in social skills demanding integrative capacities, social interaction or language abilities."(1969, p.349). They also found that of the 44 children studied (age 4 through 17) those living at home functioned at a higher level.

Johnson and Abelson investigated "Intellectual, Behavioral, and Physical Characteristics Associated with Trisomy Translocations, and Mosaic Types of Down's Syndrome. They requested that the WICHE (Western Institutions Center on Higher Education) census of behavior be administered to karyotyped Down's syndrome residents of some of the western state institutions. Their resulting data indicated that translocation cases were higher in IQ than trisomies or mosaics, and that mosaics were lower in abilities than either trisomies or translocation. Nevertheless, in the brightest one percent of the Down's cases, the highest percentage was comprised of mosaics despite the fact that mosaics comprise only six percent of the total sample. They then concluded that "kind of stigmata does not allow one to differentiate between individuals on the basis of

type of Down's syndrome." (1969,p.855). Here again is an attempt to generalize characteristics of an entire population, based upon data gathered as the result of a questionnaire. That the information collected was based upon institutionalized individuals must also be noted.

Bentzen and Nielsen reported a study of "Quantitative Analysis of Language Production in Patients with Down's Syndrome". In a complex study, they gathered language samples and analyzed them utilizing a specially constructed typewriter that sorted them according to the number of words per minute, and symbolic count. Using entropy values, they confirmed that entropy value decreased as length of word increased. They compared a 13 year old Down's syndrome boy with his normal sister (who was used as a norm), and concluded that the Down's syndrome child used more primitive language, including more nouns and words of shorter average length than his sister. "While the normal twin sister used more specific terms, her brother with Down's syndrome made use of collective terms which is an expression of the lower development of his linguistic abilities." (1970,p.109).

That same year (1970) Talkington, and Hall attempted a "Matrix Language Program with Mongoloids". The 20 matched residents (mean age 24) who participated

in the program showed significant increases in their language productions over the 20 who served as a control group. The program consisted of a series of multiple picture cards and geometric forms, with a magnetic matrix board. Receptive language was taught using instructions such as; "Place the red circle on the boy wearing a hat". The expressive portion was restricted to asking the subject what he did. The correct response was "I placed the red circle on the boy wearing the hat." This was intended to "afford the opportunity for development of general language and concept skills. That significant improvement occurred in language usage under these constrained conditions is a tribute to both the teachers and the students".

Jean MacCubrey (1971) reported her attempts at "Verbal Operant Conditioning With Young Institutionalized Down's Syndrome Children". Her subjects were eighteen children ranging in age from 4 years 6 months to 7 years 10 months. That same year Melvyn Semmel and Diane Dolley reported their analysis of "Comprehension and Imitation of Sentences by Down's Syndrome Children as a Function of Transformational Complexity". Their subjects were 40 Down's syndrome children (mean age 11 years 3 months). They found that they reacted negatively to sentences containing a

negative statement, and tended to ignore the negative transformation. Imitation skills of simple declarative statements were significantly associated with IQ (a finding that disagreed with Lenneberg, 1962). The low functioning ability of the youngsters in the study (IQ 34.3) must be noted.

The following year, Peter Herriot reported on "The Subjective Organization and Clustering in the Free Recall of Intellectually-Subnormal Children". His subjects (40 retarded adults attending an Adult Training Center) were compared in their ability to sequence pictures in order, and to group them by subject in recall tasks. His results indicated that when mental age was more than 5 years, it was possible to see clustering by subjective organization. The mongoloid subjects appeared to rehearse and repeat more than non-mongoloid subjects. This was considered to be a symptom of failure to internalize. Subjective ordering was the result of rote recall strategies, which he related to overt rather than covert use of language, "and therefore with retarded internalization of language." He generalized that the mongoloid group was more retarded in this way and used more sequential strategies than the matched non-mongoloid group.(1972, p.710).

Barbara Dodd in "Recognition and Reproduction of Words by Down's Syndrome Retarded Children", attempted to find if the articulation deficit common in Down's syndrome children is caused by their general motor disability due to their difficulty in pre-programming sequences of movements. She exposed two matched sets of 10 severely retarded Down's and non-Down's children (mean chronological age 9.4 years) and exposed them to real and nonsense words.+ Delays in task requirements for recall and repetitions were made. Her data led her to postulate that since the non-Down's group was superior in recall after 15 and 30 second delay, the Down's syndrome group's difficulty "lay in remembering how to produce the word." She also stated that: "It would seem that a model for articulation facilitates immediate reproduction and it follows that the mechanism used for immediate or echoic imitation differs from the mechanism used after even a short delay." (1975,p.310). No mention was made of possible storage or retrieval deficits despite the fact that several articles had recently been published conjecturing about the possibility of these deficits in the population.

In 1979, Arlyne Gutman compared the quality of mother's speech to Down's Syndrome children with that of mother's speech to normal children. Many more studies

examining parental relationships, training programs, speech, behaviors, were to follow. Her study of "Verbal Operants in Mother's Speech to Nonretarded and Down's Syndrome Children Matched for Linguistic Level", was the first such study in the American Journal of Mental Deficiency. No review of these articles or others concerning early childhood will be included here since my concentration is upon articles more pertinent to mature language patterns which is the focus of this study. It is however interesting to note when the trend to study the language development of young children evidencing Down's syndrome became popular again. Mackay and McDonald, in "The Effects of Varying Digit Message Structures on Their Recall by Mongols and Non-Mongol Subnormals", attempted to discover if subnormal's learning might be enhanced if the material was already organized in some way prior to presentation. Using "eight mongols, eight epileptic and eight undifferentiated adults" (chronological age 31.9. with mental ages of approximately 5.9 years) all of whom had demonstrated the ability to recall 4 digit sequences, they presented redundant, partly redundant mirror, random, and four digit sequences. They found that "mongols scores for mixed messages were significantly inferior to those of the others; their scores for partly

redundant messages were only slightly poorer than those of the others". They also found that within the "mongol" group, recall was better for redundant messages. In a second study they compared the results of regular sequence messages (5,6,7,8), near regular sequences (5,6,8,7), and mixed (5,1,7,9). They found that "mongols" had significantly poorer scores for mixed and near regular messages than the other subjects, and only slightly poorer scores on regular sequences. They suspected that the "mongol" group might have anticipated structured messages and when they did not occur, failed to store the last number. They concluded " When mongols perceive structure in a learning task they are equal to non-mongols in using it to advantage. But when they do not perceive structure learning is significantly impaired." (1976,p.195). This was the last article encountered where the disagreeable term "mongol" was utilized.

Gordon and Panagos studied "Developmental Transformational Capacity of Children with Down's Syndrome". Two groups of 15 students (mean mental age 13.3) were given 50 sentence repetition tasks of mixed complexity. Types of errors were classified as omission, substitution, additions, transpositions, morpheme modification and transformations. Omission

errors were the most common (especially on the negative passive sentences), transformational and morpheme modification errors were next frequent (again especially on the negative passive sentences). The subjects were divided into a lower mental ability group (mean mental age 3.6), and a higher mental ability group (mean mental age 4.6). The lower group made a larger number of repetition errors than the higher. Analysis showed that both groups had similar qualitative errors, although the quantity of their errors was different. The authors concluded, " Our results strongly suggest that Down's Syndrome children organize their verbal performance in accordance with the same grammatical principles used by normal speaking adults and children....the results appear to support Lenneberg's slow motion hypothesis of language development in the mentally retarded." (1976,p.972).

These conclusions appear to me to be unrelated both to the test results, and to Lenneberg's statements. They can serve as an example of erroneous conclusions which are improperly made. It should be anticipated that children with lower chronological age or language ages would have quantitatively more errors in sentence repetition tasks. The number of errors does not demonstrate the grammatical principles used by the

subjects. No examples of the actual errors were included.

Rynders, Spiker, and Horrobin, published a paper noting that studies during the preceding ten years often had flaws in their methods. They argued that the educability estimate for Down's syndrome children is too low because "until recently, Down's syndrome children were given no early education that might have enhanced their abilities." (1978, p.440). They claimed that the use of traditional psychometry as an index of educability was too limiting, and suggested that studies providing more descriptive data would give a richer picture of progress and deficits.

That same year Silverstein, Aguilar, Jacobs and Levy published a report on "Imitative Behavior by Down's Syndrome Persons." After reviewing their data on comparisons between 28 Down's and non-Down's residents matched for chronological age, sex, and IQ, they concluded that there is no support for the hypothesis which had been stated by John Langdon Down, that "they have considerable power of imitation". This agreed upon "fact" had been passed on until its repetition had the "force of truth" as quoted from Rosenzweig (1953). That same year, a fascinating report by Burr and Rohr was published in Social Biology. They conjectured that

"differential development of psycholinguistic skills may be caused by phylogenetic development of the cognitive systems involved. Visual-manual skills most likely developed phylogenetically in response to the hunting tool making way of life prior to skills in the verbal auditory channel". They compared 37 Down's syndrome individuals, 34 brain damaged persons, 7 persons with known environmental retardation, and 53 of unknown etiology. The ITPA was administered to all.

When the subjects were divided and compared, significant differences were discovered between the Down's group and the others. The expressive processes (verbal and manual expression) were stronger for the Down's group, and visual processes better than auditory. They observed that the recapitulation theory suggests that:

> the anatomical and cognitive basis for visual-manual skills develops ontogenetically prior to structures associated with verbal speech and audition. Thus, the first psycholinguistic abilities lost in genetically based mental deficiency may have been the last psycholinguistic abilities gained phylogenetically. ((1978, p.19).

This is a unique theory, and one that is difficult to evaluate. Information concerning other processes needs to be gathered before drawing conclusions. However without the involved theory of

"ontogeny recapitulating phylogeny", we can view the experimentation as further confirmation of consistent performance on ITPA sub-tests by individuals evidencing Down's syndrome.

Carol Greenwald in "Communicative and Sensorimotor Development of Down's Syndrome Children", found that the communicative behavior of her subjects seemed generally consistent with the sensorimotor stage at which they were operating. "On occasion instances of more advanced communicative behavior are seen. Down's syndrome children seem to rely more heavily upon gesture than on a combination of gesture with vocalization". (1979, p.300).

McDade and Adler published : "Down Syndrome and Short Term Memory Impairment: A Storage or Retrieval Deficit?". They examined the Broadbent model (that retarded subjects possess limitations in the quantity of information they can store, so that new material can be added only by means of removal of earlier stored material), and the contrasting "bottleneck theory", (that memory is restricted by difficulty in retrieval of stored material). Their subjects were eight Down's syndrome individuals (no chronological ages were given) with mental age between 3.5 and 5.5, matched with preschool children (for mental age). They assessed

memory for auditorially presented stimuli and visually presented pictures, in recall, verbal recognition, and nonverbal recognition tasks. They concluded that The Down's group performed more poorly than the mental age matched group on auditory recall. The Down's syndrome group showed significant retrieval deficits for auditorially presented unrelated words. Their visual memory and recall skills were about equally poor.

The matched mental age group demonstrated significant improvement in these skills when a recognition format was introduced whereas the Down's group did not. These data are consistent with that of the other researchers previously cited. They interpreted the data as indicating that the Down's syndrome subjects possessed both "storage and retrieval limitations for auditorially presented material coupled with a severe storage deficit for visual stimuli." (1980, p.566).

Silverstein, Legutka, Friedman, and Takayama reported that four items of the Stanford Binet Intelligence Scale favored Down's syndrome subjects. All of them involve figural content and visual-motor ability. Five other items "that favored non-Down's subjects are somewhat more diverse in nature, but in general they involve semantic content and social

intelligence, general comprehension and or judgement and reasoning." They based their judgments upon institutionalized residents of a state hospital who had been tested with form L of the Stanford Binet test. One possible explanation considered was the type of instructions used. The items that favored Down's individuals required following visual directions, and the items favoring non-Down subjects employed verbal directions. The researchers suggested that further studies should look beyond "omnibus tests to measures of more specific abilities." (1984, p.520).

At the same time, "Auditory and Visual Sequential Memory of Down Syndrome and Nonretarded Children" by Marcell and Armstrong was published describing three experiments. The first was the administration of the ITPA to retarded and Down's subjects. Only visual sequential memory and auditory memory tests were used. Next, two studies geared to control variables of speed of administration, complexity of instructions, nature of stimulus, and mode of subject response, were carried out. Their conclusions were that the Down's group was indeed poorer in their performance of remembering verbal-auditory material. They speculated that this deficit is a general difficulty and not one related to the sequential nature of the tasks on the ITPA. They

theorize that echoic memory decay might be the reason.

In the past two years, a vast amount of information concerning the Down's population has been reported. The 1984, 1985, and 1986 issues of the American Journal of Mental Deficiency, (the journal where the majority of articles concerning the Down's syndrome population have traditionally been published) have included titles such as: Development of Alzheimer's Disease, Down's Syndrome Individuals Fail to Habituate Cortical Evoked Potentials, Speech Training by Parents, In Home Observations of Young Down's Syndrome Children, and Personality Stereotypes. Quite a difference from the first issues described in my review of the literature!

This year a new journal "Trisomy 21", has been published. According to John Hamerton, the editor of the journal, "the editors and publishers hope it will fulfill a need by bringing together studies of Down's syndrome from a wide variety of multidisciplinary fields". Its publication demonstrates the current increased interest that has been evolving concerning this population. Given the issues and trends that have taken place over the past 40 years in both mental retardation and speech pathology, several interesting trends must be noted. The first is the demonstration of how stereotyping and vague general statements and myths

presented in some early articles were perpetuated until accepted as truths. (Rosenzweig 1953, Lenneberg 1962, Blessing 1959). It also was apparent how particular issues provided the focus for research. Biological aspects were initially investigated,(Jervis 1941, Beidleman 1945) social issues followed next (Aldrich, 1947; Ellis and Beechley, 1950). As institutionalization became less of a focus, articles were written categorizing and establishing the incidence of defects of the Down's syndrome population (Zisk 1968; Fishler and Share 1964; McIntire 1965). As our general information developed regarding language and psycholinguistics, emphasis upon these aspects was reported in the literature (Bilovsky and Share 1965; McCarthy 1965; Ellis and Anders 1968, Burr and Rohr (1978) Dodd 1975; and McDade and Adler 1980).

Despite this new information, few studies have been published concerning specific intervention techniques or making educational suggestions for the Down's syndrome population. (Talkington and Hall 1970; McCubrey 1971). Currently, developmental patterns and parent child interactions appear to be a focus. (Cicchetti and Stoufe 1975, Hill and McCune-Nicolich 1981, Greenwald and Leonard 1980; Cornwell 1969; Salzberg 1983; Kopp, Krakow, and Johnson 1983; Owens and MacDonald 1982; and

Ashman 1982). The majority of the studies reviewed here were designed utilizing either institutionalized adults, or young children. Notable exceptions were Gordon and Pangos (1976) who used subjects with a mean age of 13.3. Burr and Rohr (1978) might also have included some young adults in their study, however the chronological ages of subjects were not included in the documentation. Herriot (1972) used adults from a training center; it was not mentioned if they were institutionalized. Bilovsky and Share (1962) used subjects between the ages of 6 and 23 years.

My review of the literature confirms my initial assumption that there is a paucity of information concerning the Down's syndrome individuals. What information does exist is so scattered in a variety of dissertations, journals, and books that it is difficult to follow trends and draw conclusions. Valuable information has been gained from compiling these studies, analyzing them, and determining which studies perpetuate myth, and which are well founded and contribute to the body of knowledge concerning individuals with Down's syndrome. What is needed is a base of information upon which we will be able to build and design remediation programs, form appropriate educational strategies, and carry out future research

that can further enlighten us about the characteristics of individuals evidencing Down's syndrome.

CHAPTER III

METHODS AND MATERIALS

ITPA

Test Design

The revised edition (1965) of the ITPA (Illinois Test of Psycholinguistic Abilities by Samuel Kirk, James McCarthy, and Winifred Kirk) was utilized in this study. According to the authors, the object of the test is to "delineate specific abilities and disabilities in children in order that remediation may be undertaken when needed". They considered it to be a diagnostic test of "specific cognitive abilities", as well as a "molar test of intelligence" dealing with the "transmission and reception of information and intentions, and attempts to interrelate the psychological functions that are involved in these processes".

The test design is based upon the postulate that there are three types of abilities that are directly related to cognitive abilities; channels of communication, psycholinguistic processes, and levels of organization.

Channels of communication refers to the modalities through which information is received and transmitted (auditory motor, auditory vocal, visual motor, and visual vocal). Psycholinguistic processes relate to organizing processes (those that involve internal manipulation). These processes include receptive as well as vocal and gestural expressive processes. Levels of organization includes two levels, the representational level, where processes are more "complex" requiring symbols to represent and convey the meaning of objects and intentions, and the automatic level, where functioning is considered "less voluntary" but organization and integration also takes place.

REPRESENTATIONAL LEVEL

Specific sub-test descriptions

Sub-test 1. Auditory Reception

"Assesses the ability of the child to derive meaning from verbally presented material." In order to minimize requirements upon the child other than those specifically being tested, only a "yes" or "no" response is required on this sub-test. A single sentence format

is used throughout. As the questions advance, vocabulary difficulty increases. Examples: Do dogs eat? Do wingless birds soar?

Sub-test 2. Visual Reception

"Attempts to measure the child's ability to gain meaning from pictures." In this subtest of 40 items, a single picture is presented followed immediately by a page with four pictures. The child is required to associate the stimulus picture with the one that is conceptually similar to it on the following page. Here too the syntax requirements are consistent throughout "See this? Find one here."

TESTS AT THE ORGANIZING LEVEL

Sub-test 3. Auditory Vocal Association

"Assesses the child's ability to manipulate concepts and to relate them verbally". Forty two verbal analogies are presented in a sentence completion task. The child is required to complete the analogy. To reduce external requirements upon the child, syntax is kept regular, and the child's response requirement is a single word. Examples: "I cut with a saw, I pound with a -----."

Sub-test 4. Visual Motor Association

"Assesses the ability of the child to relate visually presented concepts." On the first 20 items of this sub-test, the child is presented with a single stimulus picture which is surrounded by four pictures. The child is required to select the one of the four that is most closely associated with the stimulus picture. Syntax is restricted to "what goes with this?" The format on the last 20 items of this sub-test changes. It becomes a test of visual analogies. Here a pair of pictures are presented on the same page as one stimulus picture which is surrounded by four other pictures. The syntax changes to "If this goes with this" (pointing to the pair), "then what goes with this?" (pointing to the stimulus picture).

EXPRESSIVE PROCESSES.

Sub-test 5. Verbal Expression

"Assesses the child's ability to express his own concepts vocally". For this test, four items (a button, envelope, ball and block) are presented individually and the child is urged to "tell me all about this". Credit is given for the number of "discrete, relevant, and

approximately factual concepts expressed."

Sub-test 6. Manual Expression

"Tests the child's ability to manually express ideas." Fifteen pictures of objects are shown individually with the directions "show me what we do with a ---". The child is required to pantomime actions. Scoring credit increases with the completeness of the actions.

SPECIFIC SUB-TESTS OF AUTOMATIC FUNCTIONS

Sub-test 7. Grammatical Closure

"Assesses the child's ability to respond automatically and supply syntax and grammatical inflections to complete sentences presented visually and verbally." Each presentation includes a picture, a complete sentence, and one to be completed. Example, "here is a dog" (pointing to a picture). Here are two ----" (pointing to the picture).

Sub-test 8. Visual Closure

"Assesses the child's ability to identify an object from an incomplete visual presentation". The child is required to demonstrate how rapidly it can locate the other examples of a shown picture within 30 seconds.

Four separate scenes are presented separately.

MEMORY

Sub-test 9. Auditory Sequential Memory

"Assesses the child's ability to reproduce from memory sequences of digits increasing in memory sequences of digits increasing in length from two to eight." Two trials (of differing point values for scoring) are allowed. Digits are presented, two per second each trial.

Sub-test 10. Visual Sequential Memory

"The child is required to reproduce placement of sequences of chips with non-meaningful figures from memory.

The administration and scoring of the ITPA test battery must be accomplished according to very rigid standardized procedures. The examiner is not allowed to alter any of the directions by omitting any portion of the instructions, giving non-standardized instructions, or changing the sequence of the administration of sub-tests. Included in the instructions are specific words that must be given by way of instruction preceding

each sub-test. Instructions for basal scores and ceiling scores are also given. In the majority of the subtests, only one trial is allowed, and accuracy of each response is counted. In two of the sub-tests a second trial is allowed and the score is reduced by one half for that item.

TOKEN TEST

The original Token Test was developed in 1962 by DeRenzi and Vignolo as a means of "detecting receptive language deficits in aphasic adults". The test was described as meeting several "ideal" conditions for language testing including: "1. sampling various levels of linguistic, but not intellectual abilities; 2. sampling various levels of linguistic difficulty without the use of obscure language; 3. sampling language without the use of extensive memorization; and 4. sampling language within a relatively brief period of time." (Lass and Golden, 1975).

More recently it has been used as a tool for assessing language functions in children. Since the original version, numerous similar tests have been developed. The form of the Token test utilized in this study is The Token Test For Children by Frank DiSimoni.

High positive correlations have been shown to exist relating the Token Test with receptive measures of the ITPA (Fusilier and Lass, 1973) as well as with the Peabody Picture Vocabulary Test, and the Preschool Language Test (Lass and Golden 1975) thus demonstrating its suitability for being used as a "valid and sensitive indicator of receptive language function in children".

The test is composed of five sub-tests each "presenting progressively longer and more complex commands" (Token test manual). Subjects are asked to manipulate tokens of five primary colors shaped in large and small squares and circles.

Sub-test 1. Requires that the subject respond to commands of a single attribute from a display of the five large squares and five large circles. Commands to "touch the yellow circle" are given.

Sub-test 2. Involves two attributes. From an arrangement of 20 tokens (five large and five small circles, as well as the large and small squares), the subject is requested to "touch the small yellow circle".

Sub-test 3. Involves two commands of two attributes from a display of the five large circles and five large

squares. The subject is requested to "touch the yellow circle and the red square".

Sub-test 4. Tests two commands involving three attributes from a display of five large circles, five small circles, five large squares, and five small squares. In this section requests are made (for example) to "touch the big white square and the big red circle".

Sub-test 5. 21 concepts such as "in front, if, except, without, between, under, quickly etc..." are added to the complexity of the test. Here, the subject is requested (for example) to "pick up the squares except the yellow one" from a display of five large circles and five large squares. It has been suggested that prior to the administration of this test, children be informally tested to determine that they comprehend the words: circle, square, large, small, and color names.

Scoring of the Token Test is accomplished by adding the total of accurate responses. Only one response is allowed, and repetitions of instructions are not allowed. Age norms are provided for comparisons to be made.

CELF

The Clinical Evaluation of Language Functions (CELF) was developed by Elizabeth Wiig and Eleanor Semel as an outgrowth of "formal investigations of the prevalence and nature of learning disabilities in children and adolescents with diagnosed language disabilities." (Wiig and Semel,1980). The general purpose of the CELF, according to its authors, is to provide "differentiated measures of selected language functions in the areas of phonology, syntax, semantics, memory, word-finding, and retrieval." It was anticipated that these measures would probe specific language processing and production abilities of school age children (from kindergarten through grade 12) for the purpose of "assisting in the identification of children with language problems"; providing a "differential diagnosis of areas of involvement"; and "identifying areas for follow-up intervention".

The test is composed of ten sub-tests and two supplementary sub-tests. Six sub-tests are designed as processing sub-tests; five sub-tests are designed as production sub-tests, and two as supplementary tests. Three of these production sub-tests are timed tests, and all others are scored for the accuracy of the response

given.

The administration of this test permits individual sub-tests to be utilized independently. Order is not an important factor, nor is it necessary to utilize a strict time schedule on the sub-tests not specifically designated as timed. All processing sub-tests and production sub-test 10 permit the subject to request repetition of an item.

Scoring of repeated test items is reduced by one point. Scoring of all sub-tests is accomplished by totaling the correct answers. These scores are then converted into grade norms by use of a table provided on the cover sheet of each test battery. Norms for the CELF are available in the following forms: language age score of total processing and total production sub-tests (with the exception of sub-test 7); percentile ranks for grade levels for the total production and total processing; and individual sub-test's pass/fail criteria by grade level. Language age represents "the age for which the given score is the estimated (or obtained) median". It must be noted that the highest meaningful CELF language age is determined by the authors to be 12-0 (CELF update 111). Pass/fail criteria for grade level were determined by utilizing a raw score for criteria cut off near the 20th percentile as an

indication of possible language deficiencies. The authors suggest that failure of a single sub-test is not uncommon for normal children, therefore the criteria for identification of possible language deficits should be failure of three or more sub-tests. They also caution the user of the battery against relying too heavily on the utilization of a single test to portray an accurate picture of a student's language abilities.

INDIVIDUAL SUB-TEST DESCRIPTIONS

Sub-test 1. Processing Word and Sentence Structure

"This sub-test was designed to assess the child's ability to process and interpret selected word and sentence structure". Each of the sub-test's 24 items is comprised of a display of four pictures, one of which accurately represents the test sentence. Prepositional phrases, pronouns, verb tenses, noun modification, passive transformations, and relative clause transformations are included. An example of a test item is: "the car has flat tires".

Sub-test 2.Processing Word Classes

"This sub-test was designed to evaluate the child's ability to perceive relationships between verbal

concepts and to identify word pairs which are associated by class membership, antonymy, agent-action, or superordinate-subordinate relationship. Associative word pairs are to be identified by the child from a series of words." Each series contains foils that are also related subclasses to the word pair. Twenty two items of three or four words are tested. An example of this test is: "far, near, big, late".

Sub-test 3. Processing Linguistic Concepts

This sub-test was designed to "evaluate the child's ability to process and interpret oral directions which contain linguistic concepts requiring logical operations." Restricted vocabulary in the directions utilizes only the words; "point to, line, red, blue, and yellow". The 22 directions range from seven to 21 words in length. Concepts tested include: inclusion, exclusion, coordination, instrumental, conditional, and temporal. The subject is required only to point to the selected picture. An example of this sub-test is: "point to the line that is not yellow".

Sub-test 4. Processing Relationships and Ambiguities

This sub-test was designed to evaluate the child's ability to process and interpret logico-grammatical and

ambiguous sentences." The 32 items are presented in a yes/no question format. Relationships tested include: comparatives, passives, temporal, spatial, familial, and analogous. Idioms, metaphors and proverbs are also tested. Examples: "Strike while the iron is hot. Does it mean you must hit with the iron while it is hot?" "Ann is shorter than Bill and Bill is shorter than Betty. Is Ann the shortest?"

Sub-test 5. Processing Oral Directions "This sub-test was designed to evaluate the child's ability to interpret, recall and execute oral commands of increasing length and complexity." Twenty five oral commands of different complexity are presented. The subject is required only to point. Size, shape, color, serial and spatial orientation are used in the testing items. Directions include one, two and three level commands, as well as noun modifiers. Examples of test items are: "Point to the smallest black square"; "Point to the first triangle".

Sub-test 6. Processing Spoken Paragraphs

"This sub-test was designed to evaluate the ability to process and interpret spoken paragraphs and recall salient information presented". Four paragraphs of

increasing length and complexity are presented to the subject who is then asked to recall details about the paragraph by use of wh-question formats.

PRODUCTION SUB-TESTS

Sub-test 7. Producing Word Series

"This sub-test was designed to assess the child's accuracy, fluency, and speed in recalling and producing selected automatic-sequential word series. "Two items are tested by this sub-test: the names of the days of the week, and the names of the months of the year. Both items are scored for accuracy and speed. The authors feel that this sub-test probes long-term memory as well as accuracy and speed of "automatic serial language".

Sub-test 8. Producing Names on Confrontation

"This sub-test was designed to evaluate the accuracy, fluency and speed in naming colors, forms, and color-form combinations in a sustained confrontation-naming task." Thirty six shapes (triangles, circles, and squares) are presented randomly in color (red, blue, black, or yellow). In this sub-test both speed and accuracy are scored. The purpose for inclusion of this task was to uncover the possible

presence of "dysnomias" in subjects.

Sub-test 9. Producing Word Associations

"This sub-test was designed to evaluate the quality and quantity of the retrieval of semantically related word series from long-term memory." The test requires identification, and production of as many related class members as is possible within a 60 second period. Classes of animals and foods are used as topics. Fluency, speed, associative grouping strategies, and retrieval abilities are examined by means of this sub-test.

Sub-test 10. Producing Model Sentences

"This sub-test was designed to assess the child's productive control of sentence structure in a sentence repetition task." Thirty sentences of increasing difficulty are presented. Vocabulary difficulty increases, as does length and complexity of the sentences. The subject is required to repeat back the sentence. Both meaningful grammatical sentences as well as "syntactically and semantically varied sentences" are presented.

Sub-test 11. Producing Formulated Sentences

"This sub-test was designed to evaluate the child's ability to formulate and produce sentences when word and sentence form choices are limited and when semantic and syntactic constraints are introduced by a word which must be included." The subject is required to formulate a sentence including a stimulus word (car, yellow, children, nothing, what, belongs, because, slowly, after, tell, herself, and if). The responses are scored for complexity of structure according to a point value system which increases the number of points earned with the sophistication of the sentence constructed.

STATISTICAL ANALYSIS

Statistical analysis of both the individual's sub-test scores and those of each sub-test as a group were calculated. Standard deviations were determined individually. They were also calculated for each sub-test of the batteries as a group. Pearson correlation coefficients were utilized to make comparisons and to show relationships between sub-test means on the ITPA, the CELF, and the Token Test. Paired t correlation tests were performed for each of the test batteries in order to determine which means showed statistically significant differences from the others.

LANGUAGE SAMPLES

Language samples were obtained from 15 of the most intelligible subjects. Spontaneous conversation concerning events, and circumstances of interest to them were the basis of these conversations. The samples were recorded utilizing an inconspicuous cassette tape recorder and a microphone. The samples were transcribed as soon as possible after the recording to insure fresh recall of the conversation and circumstances. In addition to these conversations, sub-test 10 of the CELF (producing model sentences) was also recorded and later transcribed. When transcribing the tapes each tape was played in its entirety to familiarize myself with all aspects of the conversation, and to alert myself to areas that would be difficult to comprehend. It became apparent that the poor intelligibility of the subjects caused transcription to be extremely slow and tedious so the following procedure was initiated. After the initial review of the tape, headphones were attached to the recorder. A second recorder with a microphone attached was then turned on. This enabled me to repeat exactly what I heard from the first tape into the microphone to a second tape. I was then able to transcribe my voice

repeating the subjects' words and phrases. This simplified the transcription process considerably. Words and phrases that were unintelligible on the initial recording were bypassed and later attempted again. Transcriptions were re-read together with the initial recording of the subjects for accuracy. When words or phrases were unintelligible, they were deleted from the transcription and no attempt was made to analyze them. Single or two word responses to questions were also omitted from the transcription unless these responses reflected typical spontaneous language usage of the subject.

With the aid of a computer programmer a computer program (Lexicalc) was developed for the Apple][to facilitate the analysis of the samples. The program allows the user to type in each utterance using a series of designated symbols to mark omissions, inaccurate usage, additions of words, fillers, words used in the wrong order or place, negation, wrong tense usage. Informational comments can be inserted where needed. Several extra symbols were added to permit the user to designate them to count whatever was deemed necessary for that sample. After all samples were recorded, the computer prints out the count of all symbols designated, counts the total number of words uttered, (excluding

fillers and additions) and gives a MLU (mean length of utterance) of the sample. This information (along with the entered sentences) can be printed. Each symbol used is grouped together, and the utterance that was counted by each specific symbol is noted by the word and sentence number in which it appeared. (see appendix)

Lexicalc accomplishes the analysis of each language sample by making an initial pass through the sample and breaking the text into individual words. Sentence numbers are tagged onto the end of the word for final output. The program sorts this list alphabetically using a binary sort algorithm. At this point Lexicalc makes a second pass through the list and tabulates the results. Word counts, the number of different words counts, and token counts are calculated at this time. Mean Length of Utterance (MLU) is calculated as the final step. The list of possible tokens to be used was compiled and stored in a sequential access file. A subset of this list was comprised of tokens designated not to be counted. This enables the user to insert comments and information pertinent to the analysis, that are not part of the subject's utterance, for example; the designation of omissions (*) which are listed as a group, but are not counted in the total MLU. The output lists these tokens with NC (not counted). Lexicalc

accesses this token list at "runtime" enabling the user to designate a different set of tokens if necessary. This allows expansion and flexibility in the use of tokens. Lexicalc was written in Applesoft basic, and compiled using an applesoft compiler to enhance execution speed.

SUBJECTS

All subjects in this study were between the ages of 22 and 40 and met the guideline criteria established in chapter I (page 18). Many were located in a sheltered workshop in Worchester Massachusetts. Others were working in a sheltered workshop located in Easthampton Massachusetts. A few others were referred by parents and friends. The original group of subjects (who were also included in a previous pilot study) were between the ages of 14 and 22 and were enrolled in a prevocational school setting.

Because of the nature of the testing, not all subjects were able to take all three tests. Twenty three subjects were given the Token test, twenty two were given the ITPA, and seventeen were able to take the CELF. In the pilot study, nine subjects were given the CELF and Token test and ten were given the ITPA.

TESTING SITUATION

All tests were administered in an "ideal" testing situation. A quiet private room was provided at each test site in which only the subject and myself were present. This eliminated or minimized external distractions. It also provided a "friendly" space in which the subject did not feel threatened and allowed testing to procede according to the directions provided in each test's directions for administration booklet. Reinforcement was kept at a minimum. Nodding, patting, and an occasional "good job" at the end of each sub-test were given. Reinforcement did not interfere with the testing in any circumstance.

The Token Test was administered at the initial meeting with all subjects since that was determined to be the least threatening test. The next meeting was taped for use in spontaneous language analysis (unless it was determined that the subjects' intelligibility would be too poor to comprehend and transcribe). The ITPA was given in the subsequent meeting. The CELF was given in two sessions due to its length. Sub-tests 1-5 were administered initially, and 6-10 were given in the last meeting.

DELIMITATIONS

Upper age limitation

The criteria that were established at the initiation of this study for the selection of subjects included two considerations that need discussion and clarification. The decision concerning the age limitations of these subjects was made when reseaching the literature for general information about Down's Syndrome. At that time, the incidence of structural changes in brain tissue similar to that associated with Altzheimer's disease was being revealed.

Alzheimer's disease

Alzheimer's disease has recently come to the attention of the public through a proliferation of articles, TV programs, and radio broadcasts. We now know that approximately one third of the beds in nursing homes are filled with victims of this disease (Sinex and Merril, 1982). In recent years it has also come to the attention of researchers on this disease that there might be a link between it and Down's syndrome.

Alzheimer's disease can be detected by the morphological examination of brain tissue. Lesions appear that are concentrated in the hippocampus area of the brain. It is the hippocampus region that has been indicated as playing a major role in learning and memory. Microscopic observation of tissue from this region shows senile plaques which appear as "focal spherical aggregates" (Burger and Vogel, 1973, p.460.) Neurofibrillary changes are evident in the hippocampus and on occasion in the frontal cortex as well. Granulovacuolar degeneration of neurons appear as "clear vacuoles containing small dense granules" (p.461).

Alzheimer's disease has been described by Sinex and Myers (1982) as being separated into three separate stages with differing characteristics. In the initial stage the patient is characterized as showing mood changes, lack of judgement, depression and loss of spatial orientation. Memory lapses begin at this time. In the late period of this stage, the patient enters a benign childlike state. Communication and speech begin to deteriorate. The intermediate stage is characterized by episodic bouts of irritability. The patient becomes uncooperative, anxious, physically active, and communication is lost.

Night wandering and disrupted sleep patterns appear at this time. The late stage is described as one where apathy, loss of response to stimuli, and incontinence appear. It is followed by terminal illness.

The examination of some of the articles relating Alzheimer's disease to Down's syndrome expose a conflict of opinion between the researchers. Ball and Nuttall (1980) stated "Individual histopathological lesions in the cerebral cortex of patients with Down's syndrome dying after the second decade of life have been described as being identical to those patients dying from senile dementia of the Alzheimer's type." (p.465). They investigated the degree of the histological changes of neurofibrillary tangle formation, granulovacolar degeneration, and nerve cell loss that occurred in patients with Down's syndrome. They found that the degree of neurofibrillary tangle formation and neuron loss was "of the same magnitude as have been found in a series of brains from patients with senile dementia of the Alzheimer's type" (p.467).

Owens, Dawson, and Losin (1971) agree that the morphological changes similar to those seen in Alzheimer's disease exist in the brains of all victims of Down's syndrome over the age of 35. However, they found only three cases of clinical

dementia among the patients they studied. Burger and Vogel (1973) examined the brains of 13 patients with Down's syndrome and concluded "This study is in accord with others and makes it clear that the patients with Down's syndrome predictaby and precociously develop fully and precisely the morphologic expression of Alzheimer'ss disease and senile dementia at or before the fourth decade." (p. 462).

A conference was held in the Santa Ynez Valley in California in 1981 entitled "Alzheimer's's disease, Down's syndrome, and Aging". The participants discussed recent findings of a variety of relevant studies. Sinex and Myers (1982) presented a paper on the genetic implications; that studies of the families of patients with the disease suggested an increased risk of developing the disorder. The National Down's Syndrome Society held a meeting in New York in November 1985. Investigators at that conference reported that "previous anecdotal statements that virtually all Down syndrome adults get Alzheimer's disease if they live long enough are not correct." (p.1152). They verified that the results of electron microscope investigations of the morphological changes showed identical changes in the brains of victims of the disease and those of Down's syndrome; only about

25-40 percent of Down Syndrome adults actually become demented. Reports by Shapiro and Rapoport (1985) of the National Institute of Aging indicate that Down syndrome adults suffer a decline in mental abilities as they age. Younger adults did better on tests of visual memory, attention and intelligence than did older individuals (p.1885). In future years, perhaps some explanation for the link will be uncovered, and some agreement between researchers will take place. At the present time, given the possibility of the existence of Alzheimer's disease in young adults with Down's syndrome, I chose to restrict my study to individuals who were no older than 40 years of age.

Institutionalization

Another restriction I placed upon the selection of my subjects was that they had not been institutionalized. Although this complicated the process of locating appropriate subjects, I felt it was an appropriate precaution to take. Barry, Groeneweg and Brown (1984) examined the mental development of 42 adults with Down's syndrome to determine if there was indeed a mental decline in their subjects' abilities over a period of time. They

concluded that mental development does continue to occur. They also found that when comparing those adults who had been institutionalized with those who had not, the institutionalized subjects "scored consistently lower on all performance measures"..(p. 256).

In 1959 Lyle examined the effect of institutionalization on the verbal development of children. His review included the following statement " A number of studies, such as those of Spitz (1946), Skeels et al. (1938), Goldfarb (1943, 1944, 1945-45); and others reviewed by Bowlby (1951), MCCarthy (1954) and Clarke and Clarke (1958) indicate that the intellectual and verbal development of children in institutions is often retarded." (p.122).

It appears to be the overwhelming opinion of researchers that the early institutionalization of individuals could depress their abilities in general and their verbal ability specifically. Since this might have interfered with normal language acquisition, I chose to eliminate that factor completely by restricting my subject selection to include only those individuals who had not been institutionalized.

C H A P T E R IV

RESULTS AND DISCUSSION

RESULTS OF ITPA TESTING

When scoring and interpreting the results of the ITPA battery the following guidelines are provided; "differences between a sub-test scaled score and the mean or median scaled score of + or -6 is within the range that over 80% of normal children score. Differences between + or -7,8,9, are considered borderline discrepancies. Differences of + or - 10 or greater is considered a substantial discrepancy" (ITPA manual).

Of the individuals tested the following composite mean scores were obtained (in months); six scores were in the 80's, ten were in the 70's, thirteen were in the 60's and three were in the 50's. To convert these scores to psycholinguistic ages they must be divided by 12.

The examination of the scaled scores (table 1) for all subjects reveals an extremely wide range of

TABLE 1

Scores (in months) ITPA

ID	VA	VC	VE	GC	ME	AR	VR	VSM	AA	ASM
1	66	39	80	64	90	80	72	82	53	38
2	78	65	78	91	97	70	67	87	65	50
3	83	*	118	68	106	64	88	100	57	48
4	69	54	I03	70	104	55	58	67	72	36
5	72	60	106	91	90	66	60	74	78	41
6	75	42	78	106	124	64	65	70	72	38
7	75	46	76	84	110	60	70	61	72	48
8	91	*	82	60	118	60	83	78	57	66
9	75	45	70	68	95	68	49	61	69	53
10	91	54	89	74	124	106	88	67	84	66
25	48	*	78	60	64	42	60	31	51	41
11	54	35	131	64	86	51	60	58	57	46
12	82	65	109	58	95	80	77	52	63	38
15	82	48	*	43	109	51	40	58	41	31
13	56	46	100	60	124	55	72	70	53	38
14	75	58	106	74	110	51	82	82	61	50
17	72	48	92	77	124	62	79	61	55	36
18	69	60	100	54	100	42	46	70	55	43
19	66	48	82	56	95	51	55	67	59	34
20	66	*	92	66	124	51	74	64	47	38
21	69	54	76	58	70	75	58	78	67	60
22	38	66	63	94	68	55	74	67	53	80
30	56	46	87	66	73	62	77	83	48	46
31	73	70	97	62	73	55	74	55	61	55
32	52	58	78	66	104	44	58	55	*	41
33	60	48	68	46	90	37	72	74	41	38
34	82	*	100	87	118	106	85	78	72	53
35	82	56	100	87	118	75	85	82	65	41
36	75	65	78	98	*	118	88	52	49	66
37	66	65	118	95	100	118	85	52	65	46
38	63	48	112	105	124	103	77	52	92	68
39	82	46	109	106	81	132	130	52	74	65

*denotes missing data

differences in all subjects test scores. The average score spread ranged between 50-65 points. Only one individual (ID #21) had as "close" a spread as 16 points between their highest and lowest score. The next lowest score spread was 42 points (ID #31), and the widest spread for these subjects was 92 points (ID #39).

"An intra-individual approach is relevant to the question: How does the child's performance on an ITPA sub-test compare with their performance on other sub-tests?" (Paraskevopoulos and Kirk 1969, p.37). In order to answer this question the mean and standard deviation were computed for each subject, this enabled each subject to serve as their own control. The deviations ranged from 14 points through 30 points (with the exception of one individual who had a deviation of eight points.) The nine individuals whose scores ranged in the 70's were the most consistent in the pattern of their deviations. The computation of each standard deviation of +1 /-1 was determined to facilitate an examination of achieved scores (table 2). In this way it was possible to determine on which sub-tests the widest deviations occurred. It was revealed that 20 of the 32 subjects scored higher than one SD (standard deviation from

TABLE 2

ITPA MEANS AND STANDARD DEVIATIONS

ID	MEAN	STDEV	LOWER	UPPER
1	66.40	18.08	48.31	84.48
2	74.80	14.20	60.59	89.00
3	81.22	23.78	57.43	105.01
4	68.80	21.14	47.65	89.94
5	73.80	18.65	55.14	92.46
6	73.40	25.94	47.45	99.34
7	70.20	18.56	51.63	88.76
8	77.22	19.48	57.73	96.70
9	65.30	14.43	50.86	79.73
10	84.30	20.51	63.78	104.81
25	52.66	14.14	38.52	66.80
11	64.20	26.88	37.31	91.09
12	71.90	20.99	50.90	92.90
15	55.88	24.63	31.25	80.51
13	67.40	26.16	41.23	93.56
14	74.90	21.00	53.89	95.90
17	70.60	24.81	45.78	95.41
18	63.90	21.34	42.55	85.24
19	61.30	17.38	43.91	78.68
20	69.11	25.95	43.15	95.07
21	66.50	8.54	57.95	75.04
22	65.80	15.38	50.41	81.19
30	64.30	15.19	49.10	79.49
31	67.70	12.66	55.03	80.36
32	61.77	19.30	42.47	81.08
33	57.40	18.10	39.29	75.50
34	86.77	19.30	67.48	106.08
35	79.10	21.76	57.33	100.86
36	76.55	22.13	54.41	98.69
37	81.00	26.06	54.93	107.06
38	84.40	26.48	57.91	110.88
39	87.70	30.43	57.25	118.13

their own mean on the sub-test determining Manual Expression (ME), and 16 of the 32 had scores of 1 or more SD higher on the sub-test Verbal Expression (VE). Ten of the subjects scores on the Visual Closure (VC)sub-test were more than one SD below their mean (five scores were missing), and 22 of the subjects had scores more than one SD lower in the sub-test Auditory Sequential Memory (ASM). (table 3)

Pearson correlation coefficients were utilized to make comparisons and show relationships comparing all sub-test means. Auditory reception (AR) scores correlated with all others, and visual sequential memory (VSM) sub-test means were not correlated with the majority of the others (table 4).

The composite means of all sub-tests were ranked according to their degree of difficulty for the subjects. Their rank order and means were as follows ME (97.5), VE (93.1), GC (72.9), VR (72.1), AR (69.0), VSM (66.8), AA (59.6), VC (51.1), ASM (46.8) (figure 1).

Paired t correlation tests were performed on 30 composite test means to determine which means showed statistically significant differences from the others. The results indicated that wide variations existed between the means of the majority of scores compared.

TABLE 3

ITPA
PATTERN OF DEVIATION ABOVE AND BELOW THE MEAN
+/-1 STANDARD DEVIATION

	#STUDENTS WHO DEVIATED FROM MEAN		
REPRESENTATIONAL TESTS			
TEST NAME	**ABOVE**	**BELOW**	**TOTAL**
1.AUDITORY RECEPTION	4	5	32
2.VISUAL RECEPTION	2	2	32
3.AUDITORY ASSOCIATION	2	0	31
4.VISUAL ASSOCIATION	0	3	32
5.VERBAL EXPRESSION	16	0	31
6.MANUAL EXPRESSION	20	0	32
AUTOMATIC TESTS			
7.GRAMMATIC CLOSURE	3	0	32
8.VISUAL CLOSURE	0	10	27
9.VISUAL SEQUENTIAL MEMORY	2	6	32
10.AUDITORY SEQUENTIAL MEMORY	0	22	32

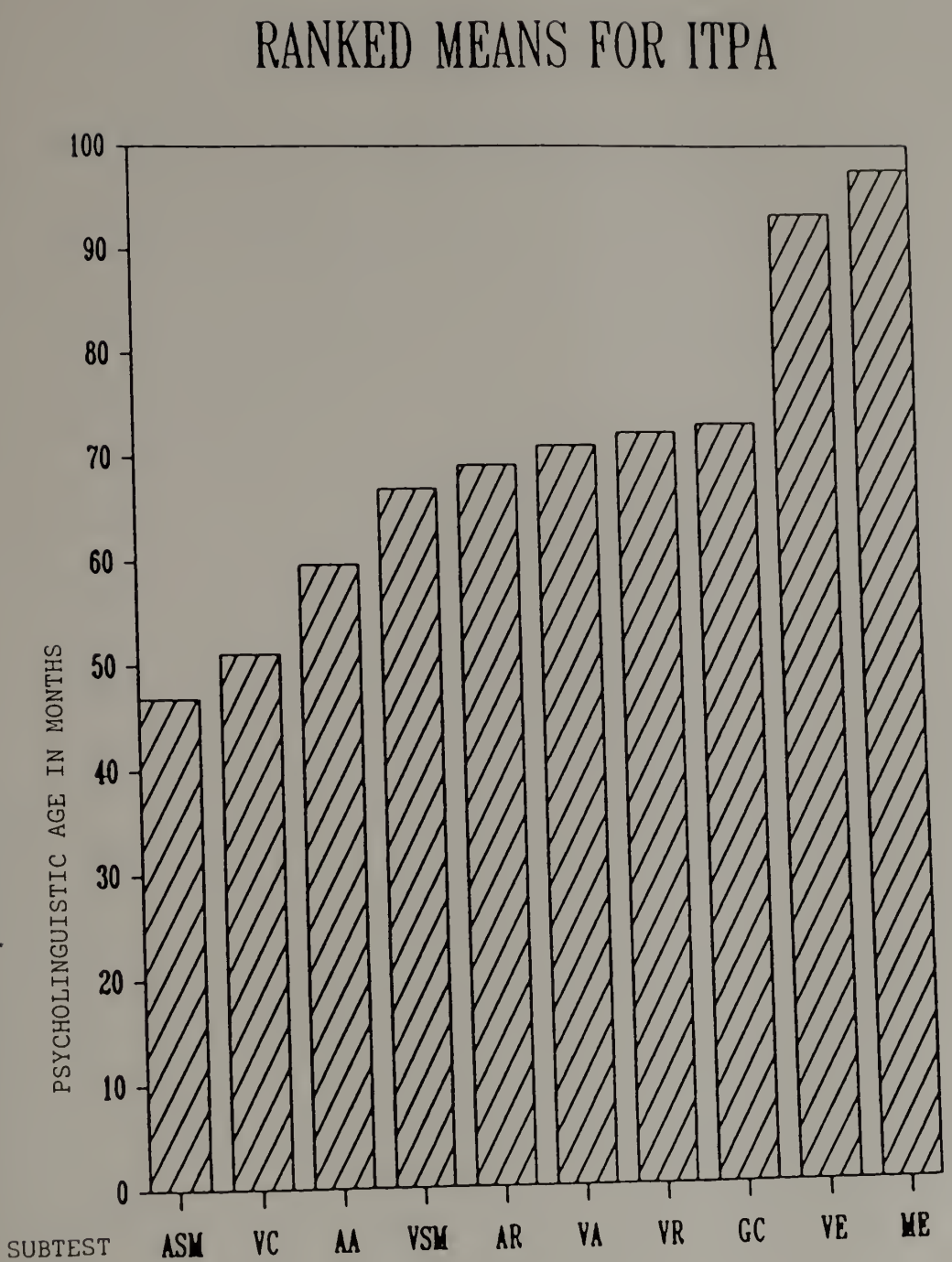
TABLE 4

ITPA

PEARSON CORRELATION COEFFICIENTS

	AP	VP	VSM	AA	ASM	VA	VC	VE	GC	ME
AP	1.0000 (0) P=.0000	.5764 (321) P=.001	-.1375 (321) P=.227	.5161 (311) P=.001	.6134 (321) P=.001	.4197 (321) P=.008	.1302 (271) P=.259	.2395 (311) P=.097	.6895 (321) P=.001	.1317 (311) P=.240
VP	.5764 (321) P=.001	1.0000 (0) P=.0000	.0555 (321) P=.381	.2206 (311) P=.117	.5039 (321) P=.002	.3624 (321) P=.021	.0920 (271) P=.324	.3056 (311) P=.047	.5283 (321) P=.001	.1117 (311) P=.275
VSM	-.1375 (321) P=.227	.0555 (321) P=.381	1.0000 (0) P=.0000	-.0459 (311) P=.403	-.0468 (321) P=.400	.3264 (321) P=.034	-.0986 (271) P=.312	-.0173 (311) P=.463	-.0671 (321) P=.358	.1980 (311) P=.143
AA	.5161 (311) P=.001	.2206 (311) P=.117	-.0459 (311) P=.403	1.0000 (0) P=.0000	.4824 (311) P=.003	.3352 (311) P=.033	.0330 (261) P=.436	.2432 (301) P=.098	.6389 (311) P=.001	.2494 (301) P=.092
ASM	.6134 (321) P=.001	.5039 (321) P=.002	-.0468 (321) P=.400	.4824 (311) P=.003	1.0000 (0) P=.0000	.3725 (321) P=.018	.1671 (271) P=.202	.0265 (311) P=.444	.4126 (321) P=.009	-.0064 (311) P=.486
VA	.4197 (321) P=.059	.3624 (321) P=.021	.3264 (321) P=.034	.3352 (311) P=.033	.3725 (321) P=.018	1.0000 (0) P=.0000	.2655 (271) P=.090	.0493 (311) P=.396	.2351 (321) P=.098	.3948 (311) P=.014
VC	.1302 (271) P=.259	.0920 (271) P=.324	-.0986 (271) P=.312	.0330 (261) P=.436	.1671 (271) P=.202	.2655 (271) P=.090	1.0000 (0) P=.0000	.0772 (261) P=.354	.0783 (271) P=.349	-.1751 (261) P=.196
VE	.2395 (311) P=.097	.3056 (311) P=.047	-.0173 (311) P=.463	.2432 (301) P=.098	.0265 (311) P=.444	.0493 (311) P=.396	.0772 (261) P=.354	1.0000 (0) P=.0000	.2049 (311) P=.135	.1073 (301) P=.286
GC	.6895 (321) P=.001	.5283 (321) P=.001	-.0671 (321) P=.358	.6389 (311) P=.001	.4126 (321) P=.009	.2351 (321) P=.098	.0783 (271) P=.349	.2049 (311) P=.135	1.0000 (0) P=.0000	.2824 (311) P=.062
ME	.1317 (311) P=.240	.1117 (311) P=.275	.1980 (311) P=.143	.2494 (301) P=.092	-.0064 (311) P=.486	.3948 (311) P=.014	-.1751 (261) P=.196	.1073 (301) P=.286	.2824 (311) P=.062	1.0000 (0) P=.0000

FIGURE 1


RANKED MEANS FOR ITPA
PSYCHOLINGUISTIC AGE IN MONTHS
100
90
80
70
60
50
40
30
20
10
0
SUBTEST
ASM
VC
AA
VSM
AR
VA
VR
GC
VE
ME

Exceptions to this were the sub-tests of visual sequential memory, visual association, and grammatic closure which all had means statistically significent to three other subtest means. This is best illustrated by their positions on the bar graph depicting the ranking order of the sub-tests (figure 1).

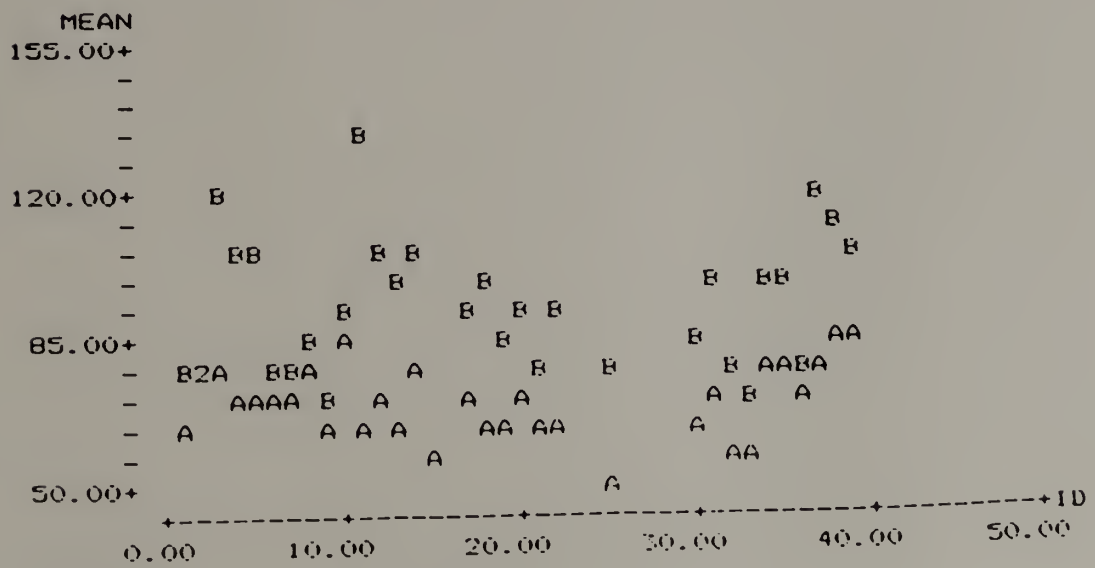
The means of some sub-tests were plotted against each individual's sub-test score to provide a graphic display of the variance found on subtests visual closure (VC), manual expression (ME), verbal expression(VE), and auditory sequential memory (ASM),(figure 2). Example: graph 1 represents subtest ASM. All points A represent the mean score of the individual and can be compared with their score on this subtest. In this graph, all subjects had a score (B) well below their own mean (A). (figure 2&3)

RESULTS OF TOKEN TEST

Score results of the Token Test are displayed in table 5. All sub-tests of the Token test contained ten questions valued at 1 point each with the exception of sub-test five which contained 21. In order to be able to make comparisons between all sub-test scores,

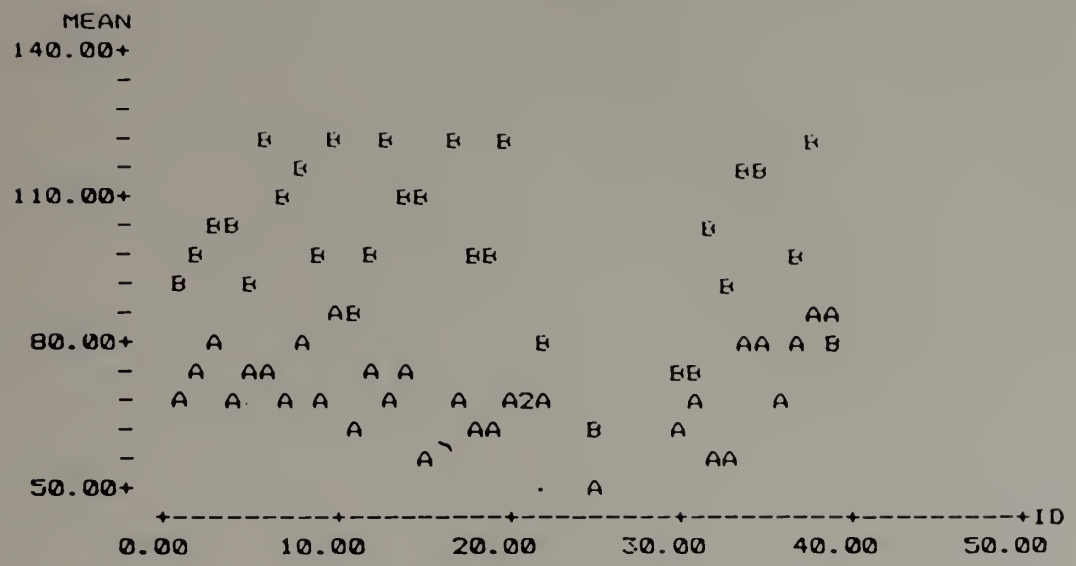
FIGURE 2
SCATTERGRAM ITPA

ITPA sub-test Auditory Sequential Memory (ASM)
A= individual's mean score
B= individual's ASM score

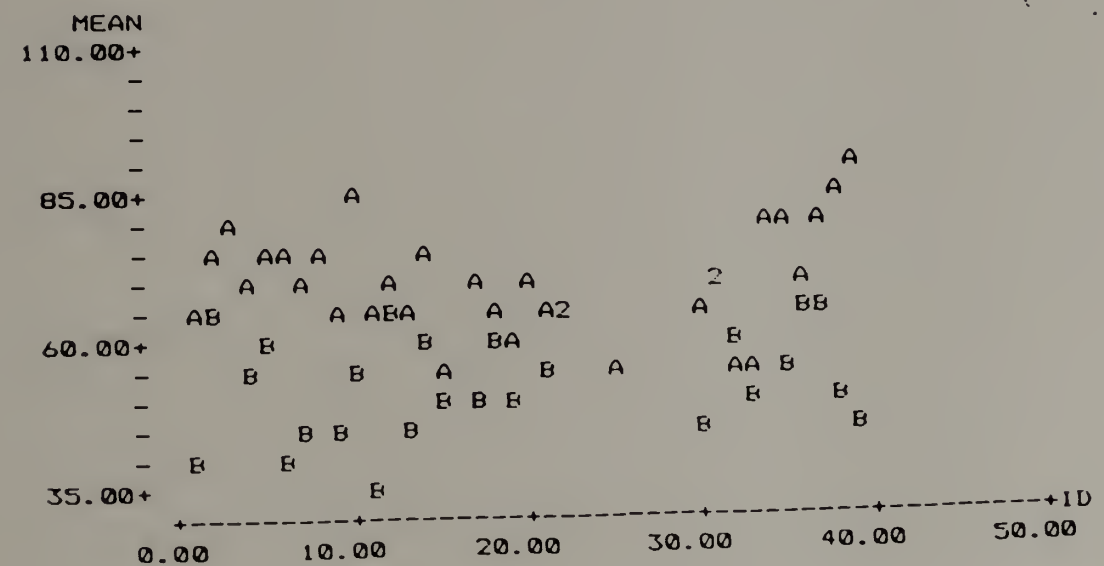


ITPA sub-test Verbal Expression VE
A= individual's mean score
B= individual's VE score

FIGURE 3
SCATTERGRAM ITPA



ITPA sub-test Mechanical Expression (ME)
A = individual's mean score
B = individual's ME score



ITPA sub-test Visual Closure (VC)
A = individual's mean score
B = individual's VC score

TABLE 5

TOKEN TEST

INDIVIDUAL'S

UNSCALED SCORES

ID	#1	#2	#3	#4	#5	TOTAL
1	10	7	3	2	2	24
3	9	6	7	6	10	38
4	10	10	4	5	8	37
5	10	10	10	5	7	42
6	9	9	10	8	6	42
7	10	6	5	1	5	27
8	9	10	8	6	10	43
9	7	8	4	0	4	23
10	10	10	7	5	7	39
11	9	7	7	5	4	32
12	9	5	5	0	3	22
13	9	7	4	4	7	31
14	10	8	10	6	5	39
18	10	4	7	2	3	26
19	10	6	6	5	5	32
26	10	8	10	4	5	38
20	8	5	0	0	0	13
21	9	9	6	1	2	27
22	9	8	2	0	0	19
23	10	8	9	3	6	38
24	10	9	4	1	1	25
25	10	5	4	4	2	25
30	10	7	6	4	8	35
31	9	7	7	4	2	29
33	10	8	7	2	3	30
34	10	10	9	6	13	48
35	10	9	5	3	3	30
36	10	7	5	5	1	28
37	10	8	5	4	4	31
39	9	9	4	3	8	33
40	10	9	4	2	7	32
42	9	5	5	1	1	21

sub-test five was re-scaled utilizing 21 as a base. The analysis of scores resulting from the Token Test was performed in a similar manner to that of the ITPA (explained in the preceding section.) The mean score for each student was calculated so that it could be compared both inter-as well as intra-individually. The composite means were compared with the established norms for the test to derive age equivalencies for them.

Sub-test #	1	2	3	4	5
* mean	9	7.5	3.26	4.5	30.5
*norm	7	4.5	4	3.5	3.5

*means are unscaled

** Norms are in years and months

Standard deviations were computed for each student. On sub-test one, 25 of the 32 subjects had scores that were one or more standard deviations above their own mean. On sub-test two, 7 of the 32 subjects also had deviations of more than 1 SD.

Sub-test three showed no scores that were one deviation above or below individual means. Sub-test four revealed 7 of 32 scores below their own means, and sub-test five resulted in 20 of the 32 scores

below their own means. (table 6)

Pearson correlation coefficients revealed strong correlations between scores on sub-tests three and four, and between four and five. All sub-test scores correlated significantly with the total score with the exception of sub-test 1. (table 7)

A graphic display of the means of each individual compared with their own performance on subtest 1 and subtest 5 was made (figure 4).

RESULTS OF CELF

The scores on the CELF are converted into grade norms by use of a table provided. The norms are available in the following forms: language age scores of total processing and total production sub-tests (with the exception of sub-test seven); percentile ranks for grade levels for the total production and processing sub-tests; and individual sub-test's pass/fail criteria by grade level. Language age represents "the age for which the given score is the estimated (or obtained) median". It must be noted that the highest meaningful CELF language age is determined by the authors to be 12 years. (CELF update

TABLE 6

TOKEN TEST

PATTERN OF DEVIATION ABOVE AND BELOW THE MEAN
+/- 1 STANDARD DEVIATION

TEST#	#STUDENTS WHO DEVIATED*	
	ABOVE	BELOW
1	25	0
2	7	0
3.	0	0
4.	0	7
5.	20	32

*32 total number

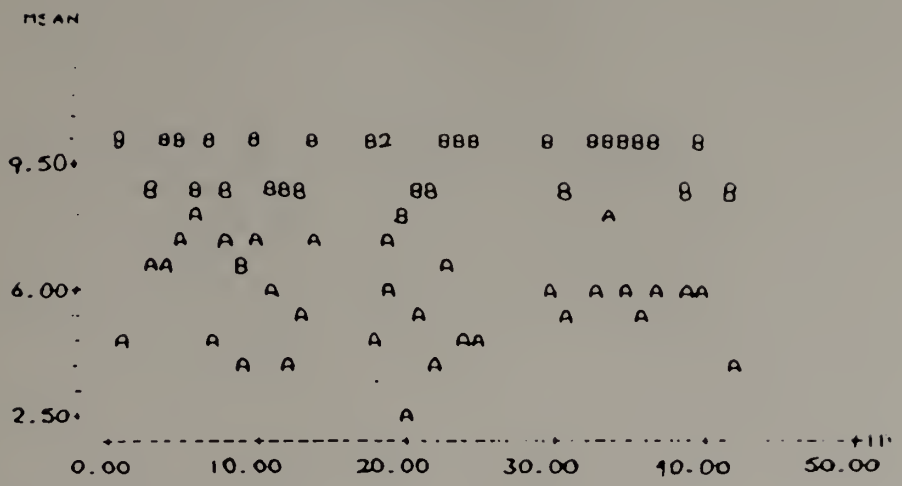
TABLE 7
TOKEN TEST

- - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - -

	M1	M2	M3	M4	M5	TOTM
M1	1.0000 (0) P=*******	.1683 (32) P= .179	.3202 (32) P= .037	.3238 (32) P= .035	.1562 (32) P= .197	.3843 (32) P= .015
M2	.1683 (32) P= .179	1.0000 (0) P=*******	.3484 (32) P= .025	.3616 (32) P= .021	.4721 (32) P= .003	.6330 (32) P= .001
M3	.3202 (32) P= .037	.3484 (32) P= .025	1.0000 (0) P=*******	.6545 (32) P= .001	.4790 (32) P= .003	.7932 (32) P= .001
M4	.3238 (32) P= .035	.3616 (32) P= .021	.6545 (32) P= .001	1.0000 (0) P=*******	.6158 (32) P= .001	.8429 (32) P= .001
M5	.1562 (32) P= .197	.4721 (32) P= .003	.4790 (32) P= .003	.6158 (32) P= .001	1.0000 (0) P=*******	.8458 (32) P= .001

FIGURE 4

SCATTERGRAM TOKEN TEST



Token Test A=mean score
B= sub-test #1 individual score

Token Test A= mean score
B= sub-test #5 individual score

III). The pass/fail criteria for each grade level was determined by utilizing a raw score for criteria cut off, near the 20th percentile, as an indication of possible language deficiencies.

Although scores on the CELF are converted to grade levels, many of the subject's scores on this battery were below the given kindergarten level on some tests (table 8). In order to make meaningful comparisons between subjects scores on all the sub-tests of the CELF it was necessary to convert all scores to the same scale. This was accomplished by taking the original score obtained, and dividing it by the maximum possible points given for the sub-test (score for grade 10-12). This was then multiplied by 50 in order to put all scores in the same range for comparison purposes. The exception to this was sub-test 7 for which the norms given were not convertable and was excluded from statistical analysis, and subtest 8 which took into account time as well as accuracy and thus could not be converted the same way.

The means, standard deviation, standard deviation +/-1 were computed (table 9). Examination of results revealed that 10 of the 26 subjects had deviations 1 or more SD (standard deviation) above their own mean;

TABLE 8

CELF

INDIVIDUAL'S

UNSCALED SCORES

ID	#1	#2	#3	#4	#5	#6	#8	#9	#10	#11
1	31	2	12	2	4	5	7	25	0	3
2	38	24	12	42	23	6	60	23	1	4
3	28	30	18	34	26	8	15	24	0	2
4	28	10	18	28	26	8	15	26	0	0
5	21	17	12	36	24	12	47	28	0	14
6	24	12	14	20	25	6	30	11	2	6
7	22	6	16	46	26	8	26	22	3	6
8	30	31	15	33	33	20	55	22	2	7
9	25	8	12	18	2	2	45	20	0	0
10	34	26	22	28	20	12	70	27	10	11
11	20	2	14	4	12	6	40	25	4	4
12	26	12	12	20	19	0	25	20	0	0
13	15	6	6	0	21	2	10	14	0	1
14	27	6	14	26	25	2	20	22	0	3
15	30	22	12	36	21	10	70	21	6	10
16	29	0	12	0	14	0	30	20	1	2
21	28	12	15	34	22	4	15	6	6	6
30	16	9	18	30	10	2	99	22	0	1
34	43	18	12	27	24	6	37	18	6	7
35	31	15	17	30	25	2	10	19	8	1
36	28	21	11	99	23	6	43	42	12	8
37	35	17	25	26	24	4	45	33	8	13
38	30	26	20	28	25	15	50	25	15	23
39	40	14	22	37	26	12	99	19	30	15
40	21	14	10	0	4	2	99	18	0	0
41	32	30	16	37	28	10	15	25	15	15

*99 denotes missing score.

Sub-test 9 scores showed 14 above their mean; sub-test ten resulted in 22 scores below, and sub-test 11 scores resulted in 19 of the 26 subjects scores below their own mean (table 10).

The sub-tests were ranked according to difficulty as revealed by the subject's means. Sub-test 7 and 8 are not included in the graph as their means could not be scaled due to the timing requirement for scoring them. They both were "easy" tests for these subjects. Subtest 9 (mean 33.6), 1 (32.5), 4 (24.4), 5 (23.8), 2 (20.2), 6 (19.2), 3 (19.0), 11 (7.6), 10 (5.9), are shown on the bar graph in that order (figure 5).

The t test analysis revealed that of 36 comparisons of composite means, all but five pairs; subtest 1, (word & sentence structure), subtest 3 (linguistic concepts), subtest 4 (relationships and ambiguities), subtest 5 (oral directions), and subtest 6 (spoken paragraphs) were statistically significantly different from each other. A graphic illustration of this can be seen on the bar graph of the rank order of sub-test means. (figure 5).

Pearson correlation coefficients were computed and revealed no negative correlations at all. The sub-tests showing the highest correlations were 10 and 11. Sub-test 9 was not correlated significantly with

TABLE 9

CELF

INDIVIDUAL'S

MEANS AND STANDARD DEVIATIONS

ID	MEAN	STDV	LOWER	UPPER
1	16.32	15.36	.96	31.68
2	24.21	15.30	8.91	39.52
3	24.07	13.43	10.64	37.50
4	23.06	13.93	9.12	37.00
5	25.75	13.17	12.58	38.92
6	19.10	9.92	9.17	29.02
7	24.84	13.36	11.47	38.20
8	29.08	16.91	12.17	45.99
9	14.87	13.44	1.43	28.31
10	28.18	10.41	17.76	38.59
11	17.44	12.19	5.24	19.63
12	16.77	13.69	3.07	30.47
13	12.26	11.99	0.27	24.26
14	20.04	13.51	6.52	33.55
15	24.94	10.80	14.14	35.75
16	14.65	14.54	0.10	29.19
30	17.43	13.33	4.10	30.76
34	23.77	13.34	10.43	37.12
35	21.72	12.87	8.84	34.59
21	19.99	11.59	8.39	31.59
36	26.41	17.37	9.03	43.78
37	27.43	13.38	14.04	40.82
38	30.95	7.55	23.40	38.51
39	32.59	7.75	24.93	40.35
40	11.95	12.91	-0.95	24.87
41	29.33	8.35	20.98	37.69

FIGURE 5

RANKED MEANS FOR CELF

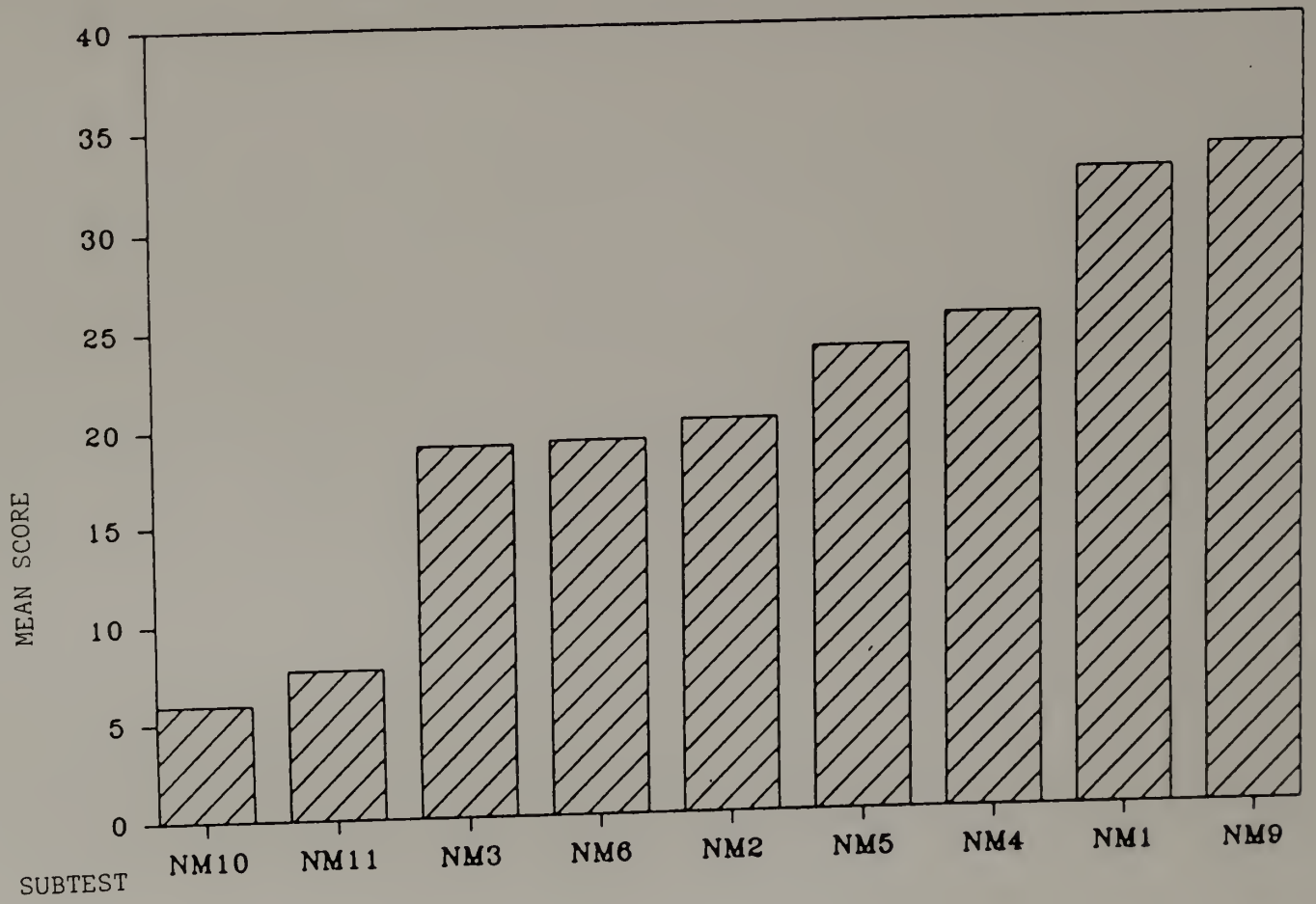


TABLE 10

CELF

PATTERN OF DEVIATION ABOVE AND BELOW THE MEAN
+/- 1 STANDARD DEVIATION*

TEST	#STUDENTS WHO DEVIATED FROM MEAN	
	ABOVE	BELOW
PROCESSING TESTS		
1. WORD & SENTENCE STRUCTURE	10	0
2. WORD CLASSES	0	0
3. LINGUISTIC CONCEPTS	0	1
4. RELATIONSHIPS & AMBIGUITIES	5	3
5. ORAL DIRECTIONS	1	0
6. SPOKEN PARAGRAPHS	2	5
PRODUCTION TESTS		
9. WORD ASSOCIATIONS	0	14
10. MODEL SENTENCES	0	22
11. FORMULATED SENTENCES	0	19

*26 total

any other sub-test. Sub-test 1 was slightly correlated with every sub-test with the exception of 9 (table 11).

A graphic display of the means of each individual compared with their own score on the sub-test was composed for subtest 9, (word associations), subtest 10 (model sentences), and subtest 1 (word and sentence structure) to easily identify trends (figure 6 & 7).

RESULTS SUMMARIZED

On the ITPA surprisingly wide gaps appeared for all subjects between those sub-tests which were ranked as "easiest" and those that were ranked as the most difficult. The sub-tests which assessed visual skills were "easier" for the vast majority of these subjects than those that assessed auditory skills. Sequential memory tests were amongst the lowest scored tests. The sub-tests that required pantomime of actions upon known objects, and single word descriptions of known objects were by far the highest scored.

On the Token Test, performance deteriorated for all subjects as length of auditory requests and complexity was added to the test. No individual was able to score as high as kindergarten level on the

TABLE 11

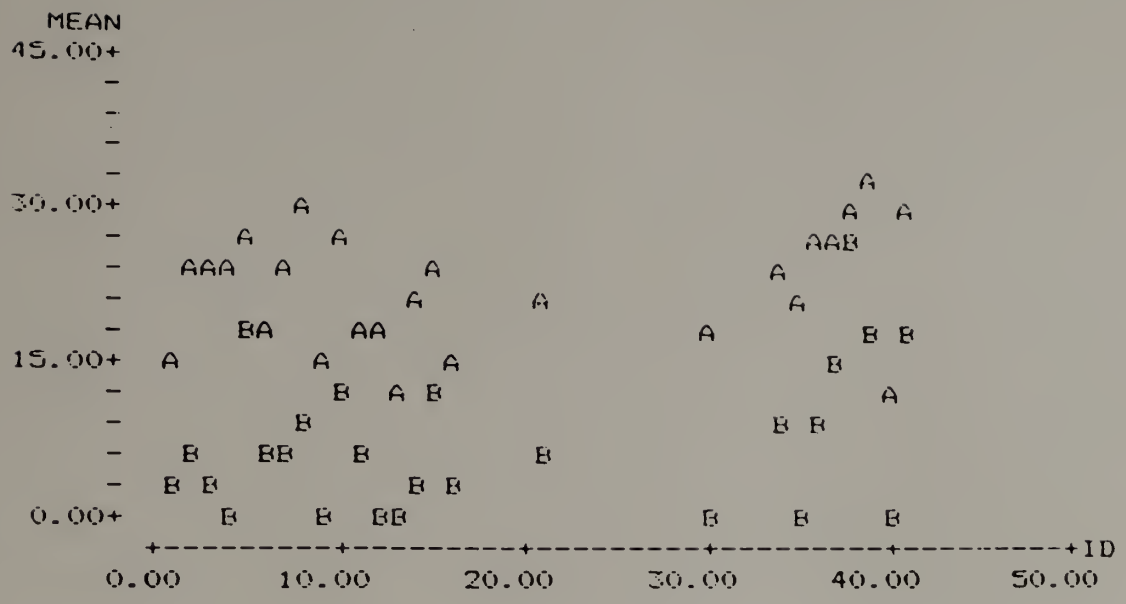
CELF

- - - - - - - - - - - - PEARSON CORRELATION COEFFICIENTS - - - - - - - - - - - -

	VAR1	VAR2	VAR3	VAR4	VAR5	VAR6	VAR9	VAR10	VAR11
VAR1	1.0000 (0) P= .	.4393 (261) P= .012	.3978 (261) P= .022	.3561 (251) P= .040	.3420 (261) P= .044	.2957 (261) P= .071	.1288 (261) P= .265	.5549 (261) P= .002	.4150 (261) P= .017
VAR2	.4393 (261) P= .012	1.0000 (0) P= .	.3063 (261) P= .064	.5776 (251) P= .001	.5534 (261) P= .002	.6623** (261) P= .001	.2714 (261) P= .090	.3413 (261) P= .044	.5330 (261) P= .003
VAR3	.3978 (261) P= .022	.3063 (261) P= .064	1.0000 (0) P= .	.4672 (251) P= .009	.3339 (261) P= .048	.3643* (261) P= .034	.2470 (261) P= .112	.5209 (261) P= .003	.4864 (261) P= .006
VAR4	.3561 (251) P= .040	.5776 (251) P= .001	.4672 (251) P= .009	1.0000 (0) P= .	.6638 (251) P= .001	.5031 (251) P= .005	.1457 (251) P= .244	.3416 (251) P= .047	.4313 (251) P= .016
VAR5	.3420 (261) P= .044	.5534 (261) P= .002	.3339 (261) P= .048	.6638 (251) P= .001	1.0000 (0) P= .	.5455 (261) P= .002	.0749 (261) P= .358	.3482 (261) P= .041	.4562 (261) P= .010
VAR6	.2957 (261) P= .071	.6623 (261) P= .001	.3643 (261) P= .034	.5001 (251) P= .005	.5455 (261) P= .002	1.0000 (0) P= .	.2314 (261) P= .128	.4176 (261) P= .017	.6869 (261) P= .001
VAR9	.1288 (261) P= .265	.2714 (261) P= .090	.2470 (261) P= .112	.1457 (251) P= .244	.0749 (261) P= .358	.2314 (261) P= .128	1.0000 (0) P= .	.1625 (261) P= .214	.2951 (261) P= .072
VAR10	.5549 (261) P= .002	.3413 (261) P= .044	.5209 (261) P= .003	.3416 (251) P= .047	.3482 (261) P= .041	.4176 (261) P= .017	.1625 (261) P= .214	1.0000 (0) P= .	.7066 (261) P= .001
VAR11	.4150 (261) P= .017	.5330 (261) P= .003	.4864 (261) P= .006	.4313 (251) P= .016	.4562 (261) P= .010	.6869 (261) P= .001	.2951 (261) P= .072	.7066 (261) P= .001	1.0000 (0) P= .

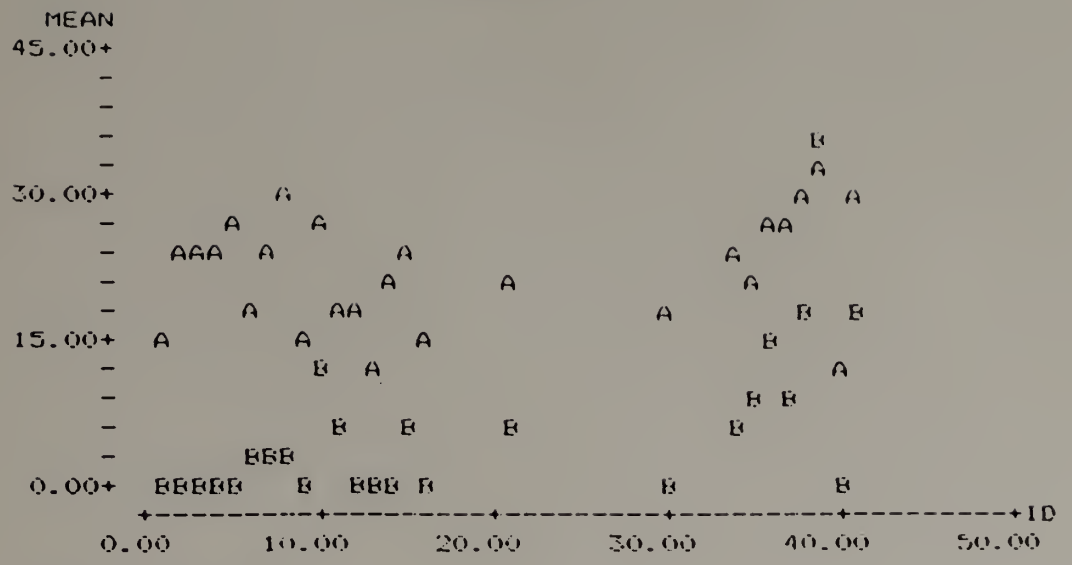
FIGURE 6

SCATTERGRAM CELF

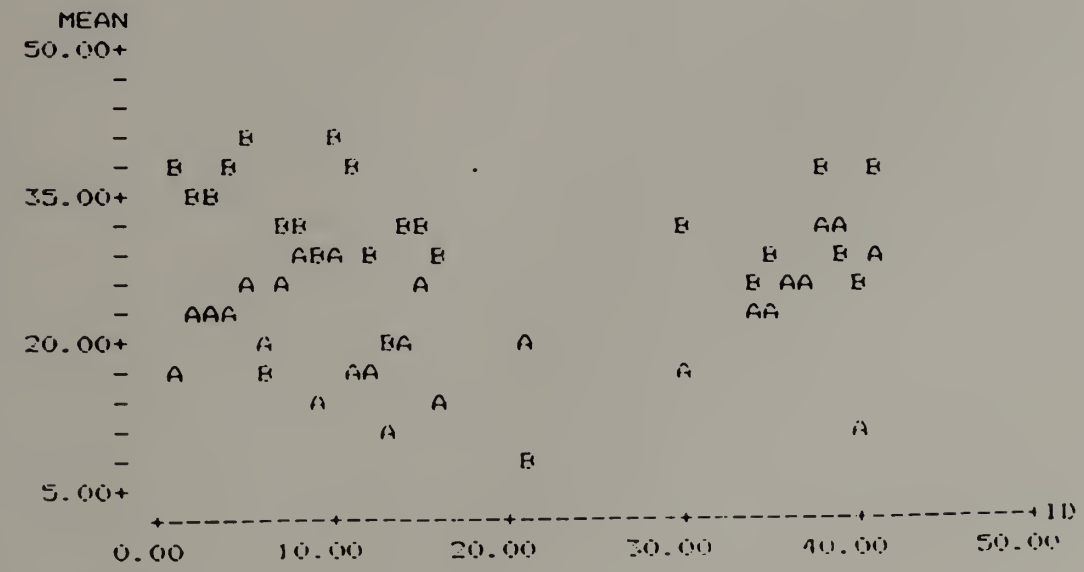


CELF sub-test 11
A= individual's mean score
B= individual's sub=test 11 score

FIGURE 7
SCATTERGRAM CELF



CELF sub-test #10
A= individual's mean score
B= individual's subtest 10 score



CElf sub-test #9
A= individual's mean score
B= individual's sub-test 9 score

last sub-test which required close attention to the individual words given in each direction.

On the CELF, consistent performance between all subjects was again seen. A very wide gap also existed between the range of each subject's scores on the battery. Those tests which assessed well rehearsed materials were the ones these subjects achieved their highest scores upon. The sub-tests which required sequencing, repeating back exact words in sentences, or using individual words to formulate grammatically accurate sentences, were ones upon which no individual achieved a score close to kindergarten level.

DISCUSSION

TEST SELECTION

It must be recognized that each investigator selects the tests they will use for a specific purpose. Each test has characteristics that can be considered as positive attributes, as well as some drawbacks. The ITPA has been in use since 1965, and has been subjected to criticism throughout the 21 years of its use. Ryckman and Weigerink (1969) believed that a factor analysis study actually did not support the basic assumption that the test assessed single skills. Prutting (1979, p.174) stated that "there is not clear evidence that psycholinguistic abilities, as defined by the authors can be separated and measured". Hare, Hammill, and Bartel, (1973) supported the process dimension theory, but not the channel concept. They concluded that the existence of separate and measurable abilities were supported by their research, however " the test loads on more than one factor "(p.15) and therefore can be evidence of construct impurity. Their research revealed that when parallel tasks were used and compared, the ITPA differentiated between language related traits, thus

substantiating Kirk's claim that the specific sub-tests used, represent discrete abilities. In response to this research, Kirk and Kirk (1978) pointed out that the authors had used eight-and nine-year-old children, "children at the upper levels of the norms" and therefore the results are of "dubious import" (p.63). In this same article they conceded that new research data indicates that the test of Grammatic Closure, "factors out as a representational rather than an automatic level test (p.64). A study by Hatch and French (1971) determined that the ITPA is a "fairly stable instrument" according to test re-test scores, however they had questions concerning the test's "factorial purity". They claimed that the sub-test Visual Reception was so weak that no confidence could be properly placed on results from this sub-test" (p.22).

The effectiveness of psycholinguistic training of the "weak areas" revealed by using the ITPA, is an issue that filled the literature for many years. Hammill and Larson (1974) reviewed 39 studies that attempted to train psycholinguistic abilities using the ITPA as the basis for demonstrated improvement. They concluded that the effectiveness of training had not been conclusively demonstrated. Kenneth Kavalle

(1981) re-examined these same studies, using a statistic called Meta-analysis which was defined as "the mean difference between experimental and control groups divided by the control group standard deviation" (p. 497). He found that the expressive processes were the channels that responded best to psycholinguistic training, and that the receptive processes and automatic level tests did not respond well.

The validity and normalization of the Token Test has been criticized as the "lack of established relationship between performance on it and functional auditory comprehension" (Werz, 1979,p.240). However Fusilier and Lass (1977) established high positive correlations by comparing the results of this test with results of the Zimmerman Preschool Language Test, and with portions of the ITPA. Wiig and Semel in the Technical Manual of the CELF reported strong correlations of sub-test 5 (oral directions) and sub-test 3 (processing linguistic concepts) of their test battery (CELF) with the Token Test. DiSimoni (1978) published norms based upon 1,304 children ages 3 through 12 and 1/2 years for the 61 items on the Token Test. The norms indicate that at the age of 8 and 1/2 to 9 years, a general plateau occurs. Jordan

and Hall (1985) compared versions of the Token Test given to 286 children in grades K-9. They found the item "touch the squares slowly and the circles quickly" had the greatest percentage of error at the Kindergarten level.

The CELF is a newer test and articles have only recently been published that include critiques. Muma (1984) criticized the terminology used, definitions, construct validity, and lack of theoretical model assumptions. Spekman (1984) wrote a critique of the battery on the basis of a lack of theoretical framework, nominal evidence of the test's reliability and validity.

It is not my intention to attempt to defend these tests. The fact remains that they are presently among the few widely known ones that can be utilized to examine and evaluate separate aspects of language, thereby permitting comparisons to be made with established norms. The ITPA allows comparisons to be made at as early a language age as three years, as does the Token Test. The CELF allows comparisons to be made at the advanced level of 12th grade. These tests also can be administered to young adults without having to apologize for the choice of materials. The pictures, drawings, and other materials utilized were

not exclusively designed to attract the interest of only very young children and therefore can be appropriately used with individuals of any age.

Although the scoring and administration procedures for the CELF battery permits the repetition of test items, in only ten instances were requests for repetition made by the subjects in this study. Most subjects immediately responded to all questions by guessing when they were uncertain of the question or the answer. This test behavior might have been because of the unavailability of repetitions on previously taken tests (although explanations included this information), or because one of the characteristics of learning disabled children listed by Wiig (1980) is their reluctance to ask for repetitions. This same behavior was observed in several prospective subject's who "confidently" went about pointing to the requested token when they in fact did not know color identification labels at all. In light of this, it is most interesting that this scoring procedure is utilized in this test battery.

SIMPLEST SUB-TESTS

It is interesting to examine those sub-tests of the CELF and of the ITPA which were ranked easiest for

the subjects in this study and to seek common attributes. On the ITPA, the simplest tests were: Manual Expression (ME), Verbal Expression (VE), Visual Reception (VR), and Grammatic Closure (GC), (figure 1). Manual Expression was the highest ranked sub-test. This required no words at all, only a complete pantomime. It should be mentioned that in six subjects their scores would have been even higher on this sub-test, however they refused to pantomime the use of matches and cigarettes, indicating that they were "bad" and thus they would have no part of them. On all of the "easy" sub-tests, responses are restricted to a manual nonverbal response. All that is required for Visual Reception (VR) is a pointing response. A single word is required for sentence completion on the Grammatic Closure (GC) sub-test, A string of individual grammatically unconnected words, (descriptive words) is required as a response on Verbal Expression (VE). For these sub-tests, no higher level verbalizations or connected speech are required; any expressive language requirements are minimal.

On the CELF, the sub-tests which were simplest for these subjects were: Producing Names on Confrontation (sub-test 8), Producing Word Series

(sub-test 7), and Producing Word Associations (sub-test 8). All of these sub-tests required naming well rehearsed material. Again, single un-linked words were the basic requirements. The vast majority of subjects appropriately responded to sub-test 7 (word series) in the allotted time. This test required the rapid recitation of the days of the week, and the months of the year. This exercise is one that regularly took place daily in classrooms, and is still a focus in sheltered workshops. The scores of this sub-test were not included in the statistical analysis since they could not be scaled for comparison purposes due to the timing requirement. The grade level criteria on sub-test a, (days of the week recitation) are the same for grades 4-12. Grade level criteria are identical for grades 5-12 on sub-test b, (naming the months of the year).

Sub-test 8 (producing names on confrontation), was the next highly ranked test (figure 5). It must also be examined in the light of the curriculum of the special education classes and programs in which these subjects were enrolled. Working with colors and shapes was a strong focus there, and time spent upon learning their identification was considerable. The first sub-test of the Token Test was ranked highest

demonstrating that it was easiest for most of the subjects. Here, again a single pointed response to a direction to select a colored shape was required.

Sub-test 9, (Producing Word Associations) required the subjects to name all the foods they could recall in 60 seconds, and then to do the same for all the animals they could remember. This is a task on which all subjects excelled. The classification, preparation, and selection of food, has traditionally been a central theme in teaching daily living skills. It was an integral part of the curriculum these subjects were being taught. Some of the jobs in the sheltered workshops included food preparation, serving, and cooking. The number of foods recalled by the subjects was predictably greater than the list of animals recalled (although this list was also impressive for some of the subjects). Much time was also spent in special education classes on animal classification tasks. Responses to this sub-test required only single word unconnected utterances.

The next highly ranked sub-test on the CELF was Spoken Paragraphs (sub-test 1). On this sub-test it should be noted that the same question "what did it cost?" was asked in two paragraphs. This item was the one which was most frequently answered correctly.

Seventy percent of the subjects accurately answered it. Considering the time spent shopping and the concentration on money skills by the programs the subjects were enrolled in, it was not surprising to find that they remembered best the question pertaining to cost. It is also strange that out of the first ten questions on this sub-test two were the same. Once alerted to the question, it might be predictable that when cost was again referred to in the next paragraph, it would focus attention upon itself and a question concerning cost again might be anticipated. It might also have been anticipated that the next most accurate response was to the question "what did Jack get for his birthday?". According to order of acquisition, "what" questions are accurately responded to by 80% of normal children by the age of three years six months (Wiig and Semel 1980). Birthdays and presents are big events in peoples lives, and attention to that sort of question is predictable. Less attention was paid to the question concerning the "name of the candy," or to "the name of the toy"; (both questions were correctly answered by only one subject). Both questions required more than a very familiar single word response. The last paragraph concerning a weather report was highly complex and few subjects were able

to even guess at the type of response required.

The analysis of what was required to be scored "correct " on those sub-tests which were ranked as simplest for all subjects, makes it apparent that they all have the same things in common with one another. A list of similarities includes: limited expressive requirements, no connected speech, subject matter that was familiar and integrated into the special education or pre-vocational curriculum, motor expressive responses, the recitation of separate words, and the recitation of well rehearsed material. It is on these tasks that all subjects achieved their highest scores.

MOST DIFFICULT SUB-TESTS

An extremely wide gap appeared between those sub-tests which were the easiest for the subjects, and the group of subtests which were ranked as most difficult. On the ITPA, the anticipated gap between highest scores and lowest scores for an individual were decided by the test authors to be six months, and 9-10 months was considered a gap in need of remediation. For the young adults with Down's syndrome who were given the ITPA in this study, the gap was often as much as 30-50 months.

The sub-tests which ranked as the most difficult

on the ITPA were Auditory Sequential Memory (ASM), Visual Closure (VC), Auditory Association (AA), and Visual Sequential Memory (VSM) in that order. No effort shall be made to evaluate or analyze requirements of the Visual closure test in this report, since the actual relationship to language production and comprehension is still being debated. Both sub-tests evaluating sequential memory skills resulted in very low scores for all subjects. Indeed 22 of the subjects had deviations of more than one SD from their own mean on the sub-test measuring auditory sequential memory skills. The similarity of task requirements between ASM and VSM is obvious. One requires recall of auditorially presented material (numbers), and the other tests recall of visually presented material.

In an attempt to discover if the auditory memory skills of Down's syndrome individuals are truly inferior to their visual sequential memory skills, Marcell and Armstrong (1981) devised experiments using material similar to that on the ITPA, but they altered their mode of presentation so that visual and auditory tasks were equated in complexity of presentation, instructions, and mode of response. They found that the Down's syndrome children had more difficulty

remembering verbal-auditory material. They indicated that in their opinion the nature of the deficit was a general one and was not caused by the sequential nature of the task.

The Auditory Association (AA) sub-test clearly was very difficult for these subjects. This test requires the subject to make verbal analogies to auditorially presented incomplete analogies. ex; "Grass is green, sugar is.....". Although the apparent requirements are only the production of a single word, the actual task requires that the referent or concept of that word be stored while the subject abstracts meaning, makes comparisons, and retrieves another referent that completes the analogy.

The most difficult sub-tests on the CELF were Repeating Model Sentences (sub-test 10), Formulated Sentences (sub-test 11), and Linguistic Concepts (sub-test 3), in that order. Twenty two of twenty six subjects scored more than one deviation below their own mean on sub-test 10, and 19 of them did the same on sub-test 11. The requirements of these sub-tests must be examined to discern what they had in common with other "difficult" tasks for these subjects. In Producing Model Sentences, the subject listens to a single presentation of a sentence with instructions to

repeat it back exactly as heard. Many of the subjects were unable to repeat back more than a single sentence. The highest score was achieved by one subject who was able to repeat back fifteen out of thirty sentences. The second highest score was by one subject that was able to repeat back just seven sentences. According to the authors of the test, Producing Model Sentences, "taps aspects of language production related to 1) knowledge of the rules for forming sentences, 2) retention and immediate repetition of sentences and word strings, 3) dependence on consistency in sentence meaning for sentence recall, and 4) resistance to deviations in meaning and structure in the immediate recall of word sequences." (Wiig and Semel, 1980, p. 115). Of the model sentences presented, sentence number 1. (The dog chased the cat), 2. (Did the boy touch the ball?), and 9. (The boy and girl picked the flowers), were repeated accurately by 60 percent of the subjects. The sentence types included an active declarative sentence, a simple interrogative sentence, and a simple declarative sentence involving a conjunction. Since these sentences were arranged by the authors in order of anticipated difficulty, it is interesting to examine the six sentences between them. These

included: a passive interrogative, a negative interrogative, a simple negative, a simple passive, a passive negative interrogative, and an "it" conjunction. Certainly length and complexity of the sentences were influential in causing errors by the subjects, but we must also consider the types of sentences tested in another light. Semmel and Dolley (1971) examined the comprehension and imitation of sentences by Down's syndrome children. They reported that their most significant finding was that the Down's syndrome children appeared to comprehend simple negative sentences as if they were "affirmative declarative strings". They concluded that:

> "Children with Down's syndrome may lack the competence to process a negative sentence into an underlying kernel plus semantic transformation. They may instead extract a kernel-like structure, similar to that of the sentences they normally hear, which exhibits a relationship of agent to recipient opposite to that in the base string underlying the negative sentence....on the other hand these children may have the competence to deal with negative sentences, but may fail to attend to the negative marker in the surface structure and thus treat the sentence as if it were an affirmative string." (1971,p.744).

The presentation of model sentences for immediate recognition is often used diagnostically for individuals suspected of having language deficits. The immediate repetitions can reveal the capacity and efficiency of the listener's short term memory. What

the subject can repeat is dependent upon a variety of factors such as the size of the unit to be repeated, the syntactic complexity, the inherent semantic components, and the actual vocabulary utilized. This type of task can be used to reveal where the subject has difficulty with language. Retention of meaning but not of surface structure is often observed in learning disabled children. In others, their sentence repetition tests may reveal an inability to recall any aspect of the sentence other than the repetition of the nouns and verbs of the sentence.

Formulating sentences (sub-test 11) was the second hardest sub-test in the CELF battery. In this test, the subject is presented with a word that must be used in the formulation of a complete grammatically accurate sentence. Requirements are that the subject must be able to use a word divorced from meaningful dialogue, and to string together a series of words using it, which would result in a complete sentence. The specific words most frequently used correctly in this task were; "Car" (it was used correctly in 11 active declarative sentences). "Seven of the sentences composed by the subjects were identical. "I drive a car." "Yellow" was used in 9 sentences which also were declarative. In most instances the word

color was also used in the sentence, for example: "I like the color yellow". "Children" was used correctly in eight simple declarative sentences. The word "tell", was used twice in negative declarative sentences ex;"Don't tell Linda". The word "what", was used in four correct interrogative simple sentences. "Nothing" was used three times by subjects making up the same sentence, "I have nothing to do". The words, "slowly", "tell", and "myself" were each correctly used by one subject. Only grammatically accurate sentences can be credited in this sub-test. Of the 22 subjects tested, only five scored at or above kindergarten level, and six failed to score more than one point on this sub-test. These subjects were obviously unable to utilize a vast amount of underlying knowledge of syntax in repeating back the sentences in sub-test 10. Some of the sentences dictated by these subjects made little or no sense. Many were incomplete and consisted of little more than a noun and verb. Some in fact did not even use the required word. Wren (1985) observed: "The Sentence Building technique appears to be prone to produce the simplest utterance possible. For example when asked to make up a sentence with the word "walking" children who typically produced more complex sentences merely

replied "I am walking"."(p. 98).

The results of sub-test 11, reveals the lack of complexity in the spontaneous usage of syntax by these subjects. It also shows the subject's inability to use a high level of metalinguistic ability as required in making up a sentence using a specific word. The majority of sentences composed were familiar ones, pairing the specified word with one that it commonly appears with: example; drive/car, color/yellow/, nothing/to do. Many of the longer complex sentences in sub-test 10 were more than likely treated as separate word strings by some of the subjects. No subject was able to repeat back any sentence beyond the eleventh one on this sub-test.

CORRELATION BETWEEN SUB-TESTS

Some correlation can be seen between repeating model sentences and repeating digit span numbers. McCarthy and McCarthy (1969) indicated that performances on the digit recall sub-test should not be used to directly predict performance on tests of immediate sentence recall. However, both the digit span recall and visual recall sub-tests of the ITPA, and producing model sentences of the CELF, were amongst the hardest tests for these subjects. Tasks on

all these sub-tests required the subjects to immediately recall and reproduce material presented to them. That material was a visual display, an auditory number string, and a grammatical string of words. McDade and Adler, (1980) assessed the abilities of Down's syndrome subjects' in recall, verbal recognition, and nonverbal recognition. They concluded that performance was poorer on auditory recall testing for the Down's syndrome group than for the matched MA control groups. They also found that this group appeared to show a retrieval deficit for auditorially presented unrelated words. This is in accord with the findings in this study of the model sentence repetition task as well as with the poor performance demonstrated on the ITPA auditory sequential memory and visual sequential memory sub-tests.

Identical results were found on these ITPA sub-tests in studies reported by Bilovsky and Share (1965) and by McCarthy (1965). Their data, which are corroborated by this study, indicate that Down's syndrome subjects possess deficits in their scores on ITPA sub-tests which purport to evaluate their auditory and visual memory abilities, and strengths in the sub-tests which evaluate motor expressive skills.

Kirk and Kirk (1978) used a report of one child as an illustration of how the ITPA should be used to gain clinical insights concerning a child. The profile they reported was of a four year old child diagnosed as having Down's syndrome.

> " This child scored at or near the five- and six-year levels on some of the visual motor the visual motor tests (visual reception, visual association, manual expression, and visual closure) but was unable to score on the auditory and verbal tests....the child shows significant discrepancies in abilities." (p. 70)

Marcell and Armstrong (1982, p. 195) propose that deficits might be due to a more rapid decay in the echoic memory of the Down's syndrome individual or that they might be slower to identify and to respond to incoming items and "thus cannot efficiently use the auditory information contained in echoic memory". Mackay and McDonald experimented with digit span messages given to Down's syndrome subjects utilizing structure and redundancy in the messages. They concluded that "when mongols perceive structure in learning tasks they are equal to non-mongols in using it to advantage. But when they do not perceive structure, learning is significantly impaired." (1976, p.195).

The last sub-test of the Token Test was markedly

more difficult than those preceding. It required responses very similar to some examined in Linguistic Concepts (sub-test 3) of the CELF,(also ranked amongst the most difficult). Both tests included the words: "not, all, except, with, after, no, instead, don't, and, before. The large number of items of exclusion and negation in this list, and the assumptions made by Semmel and Dooley (1971) enticed me to analyze the results of those tests items that in any way related to testing negation. There were no items on the ITPA, nor on the Token Test that appeared to refer specifically to a negative marker. On the CELF however, sub-test 1 included two negative questions. The subject was directed to identify the picture that showed "the girl did not climb up the ladder" (stress on the ladder was marked). Of the 26 subjects who took this test, only 4 of them correctly identified the picture. A second item on that same sub-test asked for the identification of the picture that showed "The cat is not chased by the dog" (stress to be placed on the word dog). Five of the subjects correctly identified that picture. Since there were four pictures to select from, the element of a chance selection of the correct picture must be noted. On sub-test 3 (Linguistic Concepts), there were also two

items that related to negation. "Point to the line that is not yellow" (from a display of five yellow lines and one red one). Ten of the subjects chose an incorrect line. "Point to the yellow line without using your right hand". Eight subjects were able to accomplish this task. Unfortunately, no attempt was made at that time to determine if the subject was left or right handed. Of equal interest were the results seen on the four sentences dealing with negation on Model Sentences (sub-test 10). "Didn't the rabbit eat the carrot?", brought two accurate repetitions. "The boy did not chase the girl" resulted in five accurate repetitions. "The cheese was not eaten by the mouse", was repeated correctly by two subjects. The meaningless question "The river didn't cross the rhinoceros" was never correctly imitated. Nor were any sentences past that one (#11). Some of the subjects actually changed the negative aspect of the sentence to a positive one by repeating back "the rabbit ate the carrot"; "the boy chased the girl"; and "the cheese was eaten by the mouse". In these instances even the verb was changed to indicate the passive. Several subjects also attempted to answer the questions by saying: "yes, the rabbit ate the carrot". Thus, there may be support for Semmel and

Dooley's speculations about failure to attend to negative markers.

OBTAINING LANGUAGE SAMPLES

Information concerning an individual's speech and language is generally obtained through the utilization of formal and standardized tests. It has been generally agreed that a valuable supplement to these measures is an informal procedure for obtaining and analyzing a sample of an individual's own language. By use of this method, it is possible to obtain information concerning the specific strengths and limitations of an individual's language effectiveness. Although the collection of language samples for analysis has been one aspect of research and diagnostics utilized by individuals in the field of speech and language pathology for over 20 years, there still is no single standardized method for either analyzing or eliciting the sample.

In 1960 Fredric Darley and Kenneth Moll addressed the problem of reliability in language samples. They attempted to determine the average length of a sample needed to obtain "reasonably reliable scores representing the average length and structural complexity of linguistic utterances". They concluded

that the Mean Length of Response scores based upon 50 responses are "adequate reliability for most research purposes". Gerald Siegel (1962) examined inter-examiner reliability in language samples, and recommended that tape recordings be utilized to insure greatest reliability of results. Later studies by Minifie, Darley, and Sherman (1963) confirm the reliability of this method. They also tested the reliability of seven measures of language: mean length of response, standard deviation of response length, number of one word responses, mean of the five longest responses, number of different words, structural complexity score, and the type token ratio (number of different words divided by the total number of words). They found that any single mean is but a gross measure of the child's ability. Of those studied, the Mean Length of Utterance (MLU) is the most reliable.

Stalnaker and Creaghead (1982), examined the conditions under which language samples are elicited. They obtained samples from 12 Head Start pre-school children under conditions of telling stories a) utilizing toys, b) while playing with toys, and c) using a question format with toys. They determined that each set of conditions influenced some component of the sample. Re-telling a story produced

the longest MLU, but asking questions accompanied with toys produced differences in the quality of the response. Fujiki and Willbrand (1982) compared four informal methods of language evaluation. They compared spontaneous language evaluations, elicited imitation of sentences, sentence completion, and grammatical judgment. They concluded that elicited imitation tasks, sentence completion, and grammatical judgment, might allow the clinician to focus upon specific aspects of language that would be difficult to access via a spontaneous language sample. They also noted the huge amount of time that is consumed in eliciting an adequate language sample, then transcribing it, and analyzing it. On the basis of their study, they suggested that a combination of these tools should be utilized. Language sample analysis could be supplemented by either elicited imitation, or sentence completion, in order to expedite the testing procedure.

The analysis of spontaneous language samples is another issue that must be considered. Laura Lee (1966) devised a procedure for analysis that was generally accepted and utilized by clinicians. Her Developmental Sentence Scoring (DSS) method is long and cumbersome, and therefore impractical for most

clinical use. Tyack and Gottsleben (1974) produced a handbook for Language Sampling, Analysis, and Training. Their form separates language into levels (based upon information developed by Morehead and Ingram). It has spaces for the recording of correct usage, incorrect usage, and omission of pronouns, prepositions, demonstratives, articles, plurals, locatives, conjunctions, modals, particles, copula, present progressive tense, past tense, and present tense third person singular. The form also allows questions to be listed and affords the documentation of instances of noun and verb phrases, negation, and complex sentences.

Recently, a possible solution to the time consuming tedious chore of language sample analysis has appeared in the form of computer assisted sample analysis. Miller and Chapman (1984) broke down the analysis procedure into the following time allowances for each 30 min. of audio tape: two to three hours of orthographic transcription, error checking and reliability check requires two hours, and coding for details can require up to 20 hours. Accuracy check at each level can take approximately 15% of the original time per check. To deal with this problem, they developed a computer assisted analysis program called

Systematic Analysis of Language Transcripts (SALT). The program allows the speech of two individuals to be transcribed into the computer; they are then simultaneously analyzed. Thus they could utilize this program in the investigation of care-giver interactions with children.

Mordecai, Palin, & Palmer (1982), produced Lingquest I. This program permits the user to enter the client's utterance into the computer followed by an expanded grammatically correct "idealized version of the utterance". The user must identify nouns, verbs, and other parts of speech as part of the input. The Lingquest program then analyzes the data by comparing the two samples. It identifies parts of speech, organizes the data, and yields a print-out which summarizes the data.

In order to examine the language and psycholinguistic abilities of young adults with Down's syndrome, an analysis of spontaneous utterances was part of the data collected. I decided that for comparison purposes length of utterance would be 50 spontaneous utterances as recommended by Darley and Moll (1960). The utterances would be tape recorded and transcribed as soon as possible after recording (Siegel, 1962). The conditions under which the

samples were taken were contrived to be either spontaneous conversation concerning summer vacations, the work that the subjects were involved in, family and friends. If none of the former topics of conversation provided sufficient subject matter to gather a 50 utterance sample the subjects were asked to teach me a game of cards. This format allows the gathering of spontaneous utterances of "typical" communication attempts by the subject. In addition to that sample the first 15 sentences of the CELF battery sub-test 10 (Model Sentences) were also analyzed. This allowed me to control for the comparability of the sentences produced, as well as to determine what the subject actually was capable of producing. They supplemented the language sample, by specifically providing an identical list of sentence constructions and vocabulary in a sentence elicitation task as recommended by Fujili and Willbrand (1982) and Wren (1985). The actual analysis of these 15 sentences was accomplished in a separate file. As a result each subject's production of these sentences could be compared utilizing their own spontaneous language productions. It also enabled me to compare the elicited sentences from all the subjects as a group.

LEXICALC DESIGN

In order to facilitate the analysis of a large number of language samples, I decided to utilize a computer assisted analysis program. Rather than purchase a complex commercial program such as the SALT program (Miller and Chapman), or the Lingquest I program (Mordecai, Palin, & Palmer), or other available software programs which offered little more than word counts, it was necessary to design a more appropriate program with the help of a computer programmer. The Lexicalc program was written to allow flexibility for the user. It enables the user to make an identification and count of whatever was of particular significance for my study. In all instances, type token ratio and mean length of utterance was determined. The following tokens were designated to be used as follows;

/ identifies omissions of words/morphemes, (NC)

\- " incorrect use of word or morpheme

\+ " additions of word/phrase/sound without meaning (NC)

\# " filler, generally sounds, repeats (NC)

%	"	wrong place (for words, morphemes)
()	"	informational (NC)
!	"	attention (NC)
^	"	negation
*	identifies	incorrect tense used
<	"	prefix
>	"	suffix

(NC), not counted in total MLU.

Bridges and Smith (1984) compared the syntactic comprehension of 24 children with Down's syndrome with normal children matched for verbal comprehension. They presented each child with an active and a passive sentence and told them to act out the sentence using toys. They concluded that:

> "The course of language comprehension amongst Down's syndrome children is essentially the same as that of normal preschool children of approximately equivalent linguistic ability. The response data strongly suggest that the mental processes and informational bases on which Down's syndrome children interpret sentences are identical to those by which normal children interpret sentences".(p.195).

Analysis of their data reveals some disagreement. Passive sentence performance was at or near the 50 percent level for both groups. Only non-retarded children aged 4:6 and 5 years exceeded that level. It

would seem that a less then a 50 percent accuracy level could be accomplished by chance.

Harris (1983), investigated Mean Length of Utterance by comparing ten normal children with Down's syndrome children, all in a "predominantly one word stage". Over a period of sixteen weeks they taped four sessions of each mother and child playing. They typed the words used by the children into categories such as places, pronouns, toys, household, etc... Their conclusions were that the language of Down's syndrome children "does not conform to a model of slow but otherwise normal development". (p.163). The Down's children had a higher Type Token Ratio than the normal children . They also suggested that "the pattern of correlations obtained for MLU with other language measures indicated that MLU was not representative of the same linguistic skills for the two groups" (p. 164). Here again we see evidence of disagreement between researchers on the issue of similarity between normal language development and development in the Down's syndrome population.

Language sample analysis of young adults with this syndrome might help to clarify some of the issues when compared with expectations that we might have for normal youngsters with approximately the same

linguistic abilities. According to the ITPA, the mean language age for these subjects was 69 months. In a description of the language profile of a normal six year old, Wren (1985) wrote that:

> "The normal children display frequent use of all types of complex sentences. Their errors in clause structure are very infrequent and consist of omissions of conjunctions and occasional clause elements. They use adjectives in noun and prepositional phrases ....they are likely to use appropriate word endings on adjectives and adverbs. When they make errors, these occur in phrase and word structures more commonly than in clauses." p. 91.

LANGUAGE SAMPLE ANALYSIS

When analyzing the language samples obtained by the elicited sentence format, I decided to treat each sentence as if it were a unique spontaneous utterance, and made no attempt to compare it with the model. For example, if the subject repeated back the sentence "Did the boy touch the ball?" as "the boy touched the ball.", it was analyzed as an accurately composed sentence with no errors. The sentences for the model had previously been scored by comparison in sub-test 10 Model Sentences of the CELF. Those results were discussed previously.

The phonologic system of children with Down's syndrome has been described by many researchers. Although there is disagreement concerning the

theoretical causes of the disorder (Bleile and Schwarz 1984), there is very strong agreement that phonologic disorders are pervasive amongst individuals with this syndrome. Spreen (1966) found that 95% of the individuals he studied had articulation defects. The analysis of a language sample is dependent upon the accurate transcription of all the words uttered. It is necessary to actually hear a morpheme in order to include it in the transcription. With these subjects accuracy was so much of a a problem that it was necessary to omit the majority of samples obtained. Twenty four samples were obtained from fourteen subjects that could be transcribed according to methods previously described.

The actual computer analysis of the samples resulted in varied information. The most common error seen in all the samples was one of omission. This is in agreement with research by Gordon and Panagos (1976) who classified omission errors as the most common type found in sentence repetition tasks. The individuals exhibited a wide variety of errors. Their sentence structure was simple. They used few if any complex structures at all. Many sentences were incomplete, with subject or object word missing. Pronouns and conjunctions accounted for a high

percentage of the omission errors. Indeed, pronouns were rarely used at all and verb and tense errors occurred. Irregular past tense was frequently accurate, regular tense markers however were often missing. In some instances there are even omissions of present progressive tense markers and plural markers. As a group, the language analysis data revealed immature and deviant patterns of expressive language. Little similarity can be seen between the language of these subjects and "normal" six year olds' language as described by Wren (1985). Little similarity can be seen between these samples and those of normal children at almost any stage of language development. Only the one individual who had a MLU of 1.5 could be compared with normal youngsters with a MLU of the same stage. Nouns and verbs using basic semantic relations made up the majority of the sample.

The comparison between each subject's spontaneous and elicited sample showed a uniformity of the type of error committed. If an individual had tense errors or addition errors, for example, they were apparent on both samples. The MLU of the subjects with the most sophisticated language pattern increased somewhat when given the sentence repetition tasks. The MLU of the poorer language users appeared to diminish as they

were presented with more complex structures than they could comprehend and retain. On the nonsense sentence (The river didn't cross the rhinoceros), many of these subjects just gave a single word. Because the receptive treatment of negative markers was studied by Semmel and Dolley (1971), I could not resist marking any form of negation for counting and tabulation in the computer analysis. The sentence repetition task included four sentences using some form of negation. One individual correctly repeated it in four instances; another subject repeated it three times. Most subjects repeated it once or not at all;some subjects changed the sentences to positive ones (in appendix). In the spontaneous sample analysis few instances of negation other than the word "no" as a response were used.

From these sample analyses of fourteen young adults with Down's syndrome, it is clear that their language does not follow the normal course of language development at a slower pace as Lenneberg (1964), and Bridges and Smith (1984) contended. Their language develops slowly and in a "deviant" manner.

C H A P T E R V

SUMMARY RECOMMENDATIONS AND CONCLUSIONS

SUMMARY

Thirty two young adults evidencing the symptoms of Down's syndrome were administered the Illinois Test of Psycholinguistic Abilities (ITPA) and the DiSimoni version of the Token Test. Twenty two subjects were given the Clinical Evaluation of Language Functions (CELF). The results of this battery of tests were compared to determine if the strengths and limitations displayed by the subjects showed similar patterns. Statistical analysis of the resulting scores revealed strong similarities in the performance of the subjects on many of the sub-tests.

The ITPA sub-tests were ranked according to their order of difficulty from simplest to most difficult, in the following order: Manual Expression, Verbal Expression, Grammatic Closure, Visual Reception, Visual Association, Auditory Reception, Visual

Closure, and Auditory Sequential Memory. The CELF sub-tests were ranked in this order: Word Associations, Word and Sentence Structure, Relationships and Ambiguities, Oral Directions, Word Classes, Spoken Paragraphs, Linguistic Concepts, Formulated Sentences, and Model Sentences. A consistently wide discrepancy of abilities was observed between scores on the most difficult sub-tests of these batteries and the easiest. An explanation has been presented in terms of the influence of the curriculum of special education programs on what is practiced and thereby retained in the long term memory of the students. Also discussed was the strength of the visual channel when compared with the auditory channel in these subjects. It was noted that there is a strong probability of deficits in the auditory memory systems of the individuals tested. This might influence what is attended to when listening to complex speech.

Twenty four language samples were obtained, transcribed, and analyzed, with the aid of Lexicalc a computer assisted language analysis program designed for this study. A comparison was made between elicited sentence repetition tasks, and spontaneous language sampling. Both systems of sampling revealed the same

general patterns of errors. The majority of errors found were the omissions of pronouns, conjunctions, and words of exclusion. A comparison between the language of these subjects (whose average psycholinguistic age was six years according to the ITPA) and those of the normal average six year old, revealed reasons for conflict with the theory that is often repeated in the literature, i.e. that all language development is the same.

The research demonstrated that there are definite patterns of psycholinguistic and language abilities seen on these tests of young adults with Down's syndrome when compared with children of the same "language age". These characteristics are recognizable and predictable.

* Wide gaps exist between their strongest abilities and their weakest.

* Visual skills are superior to auditory skills.

* Auditory sequential skills are their poorest abilities.

* Skills which are familiar and trained are performed consistently at a higher level than those requiring short term memory.

* Inadequate attention is paid to

the basic linguistic concepts.

* Spontaneous language usage includes a significent number of omissions of pronouns, conjuctions, adverbs and verb tense agreement.

The remediation of these potential deficits should be implemented immediately upon the identification of a child with Down's syndrome in order to prevent their predictable occurrence.

RECOMMENDATIONS

Recommendations resulting from this study will be presented at a variety of levels and for a variety of persons. Fortunately, society has currently recognized its responsibilities towards children who will need to be "specially educated". Support systems have been established in many states for these children and their families. Frequently, once the identification of a "special needs child" has taken place, support services are immediately made available. The physical characteristics of an infant born with Down's syndrome are so identifying, that time need not be wasted comparing growth and development charts to determine if the child is

achieving "developmental milestones". Immediate counseling can and should be made available to the parents and caretakers of these children. Suggestions based upon this study must initially be made at this level. Special support services including those of a speech and language pathologist can begin during the infancy of these children. A period of education for the family should begin. During this period the family should be informed about realistic expectations concerning their child. They should begin learning the normal sequences of language development. The importance of creating a beneficial language learning environment must be emphasized since language is one of the most restricted areas of growth in an individual with Down's syndrome. The parents must be helped and encouraged to create an atmosphere where linguistic growth and development will be enhanced. Because a child learns the language of its environment, the environment significantly influences what and how a child will learn. The parents must be made aware that first and foremost, they are the most vital component of their child's environment. They are the ones who structure it, and contribute widely to it. Therefore, they are the ones from whom the child will ultimately learn. They must therefore create an

environment from which their child can obtain rich experiences that nurtures language development. It is at this point that parents must be given the information concerning normal acquisition of language comprehension and expression.

The parents should be taught that their child will most likely learn best through use of the visual channel. Because of this, the parents should begin learning some basic words in sign language. Total communication approaches must be advised for parents of children with Down's syndrome. The addition of visual signs to auditory messages will enhance the early acquisition of language. At the same time, the parents should be made aware that intense stimulation of the auditory system should begin. Toys that make sounds should be sought and utilized to create an environment that focuses attention upon the development of auditory awareness. The mobiles that hang over the crib should be ones that make noise or play music. When the parent approaches the child's crib they should repeat the same single word or two word combination (for example; "mamma's coming"). This will help the child associate the repetition of the words, with the appearance of mom, and begin to anticipate her appearance when they hear the words.

In time, they will begin to attach meaning to the words. Parents should begin learning how to refine their language when speaking with their child so that they consistently use single words. They should be taught how to use their voice to alter tones to place emphasis. Infant scales of development should be provided for the parents so that they can chart the progress of the sequences of language development as they occur. The identifying ages that generally are a component of these scales should be eliminated.

The age old games of "bye-bye", and "peek-a-boo", have withstood the test of time for good reason. They are excellent teaching devices. They help the child identify a word with repetitions in activities. Variations on this sort of game should be taught the parents. Turn-taking activities help the child to learn things. Many developmentally delayed children do not learn to communicate because they have never realized that their communication has value. Teaching turn taking activities and strategies to parents presents them with a meaningful way to interact with their child, as well as teaching the child to communicate back to the parents. Imitation type games are excellent for this type of training. Again, visual accompaniment for the auditory signal (via a

gesture or sign) should be consistently used. The parent begins the sequence by precisely imitating the child. This can subsequently be built upon by the addition of other gestures or sounds. The parents should be trained to keep an account of the interactions in order to attempt to continue them for longer periods of time i.e. "one more time".

Before children begin to use words, they often communicate in other ways. Parents must be trained to recognize that their child's point to the refrigerator for milk is an attempt to communicate (without using language). They must not only provide the milk, but also the formal word (and sign) for it. A common problem with parents is that they attempt to communicate with their children as if they were young adults, by providing them with too rich a language environment. A parent may tell a child "See the tree? It has pretty leaves on it. The wind is blowing the leaves away.". For these "special" children, just the word "tree" accompanied by a sign and point, and perhaps expanding to "pretty tree" would be a better lesson. The parents must learn to keep their language short, to allow the child their turn, and to present things at a level that the child can understand and repeat. They should use a few consistent labels for

words and actions, and should restrict their talk to things that are in their immediate environment.

The speech/language therapist and the special education teacher should write their individual educational plans (IEP's) for children with Down's syndrome with an awareness of the strengths existing in their visual system, and the severe limitations of their auditory system. They should plan classroom activities that utilize environmental noises that are initially presented with visual clues. Using rhythm instruments can serve as an example of this procedure. After the child has played with the toys, they should be taught to identify them by their sounds. Once the child can achieve this goal, the next step would be to teach the child to sequence the sounds. When two diverse instruments have been played, the child should be helped to select them from a display of three instruments. Soon they can be taught to select them in the order that they were played. These types of activities can be expanded upon by use of a tape recorder and photographs. Messages from mom and dad can be recorded at home and transmitted at school. The child should learn to identify who was speaking, and the order of sequence. Teaching auditory sequencing skills should progress in a cohesive

manner. Each step should build upon those preceding it, combining visual cues when necessary and then eliminating them when the task can almost be achieved. These activities will teach these youngsters to attend carefully to auditory cues. This will in time set the format for teaching them to attend to all the sounds and words, (not just the nouns and verbs) in the message.

On a more advanced level, the classroom teacher with the aid of the speech/language pathologist should continue to design IEP goals and objectives for children with Down's syndrome. The final sub-test of the Token Test, and the Linguistic Concept sub-test of the CELF, both examined specific linguistic concepts. All subjects in this study scored very poorly on these tests. This information indicates that words of exclusion, of coordination, and of temporal relationships must be independently taught to these children. Situations should be planned whereby the child can be confronted by making the choice of "milk or juice" vs. "milk and juice". Instrumental words and conditional words must be specifically and individually taught and practiced. This practice must extend to a wide variety of situations to insure that the concept has been learned and the child has had a

chance to generalize it to other situations.

When some reading and writing competence has been demonstrated, reading and writing programs can be devised that can enhance both language production and reading skills. The strategies of predicting, confirming, and self correcting, can be combined with lessons of appropriate use of syntax. They can be practiced together using a regulated format to teach a specific linguistic objective. For example, teaching the production of regular past tense can be accomplished by devising materials that give the child lots of experience with verbs of the past tense form. Activities could be designed that eliminate the tense marker and allow the student to complete the exercise by predicting where it will occur and the form it will take. Because familiarity with the form was practiced initially, this type of exercise allows predictions and comparisons to be made. Attention to the inclusion of personal pronouns and object words can also be achieved using activities with this basic design. Since children with Down's syndrome learn best through use of the visual channel, activities of this type where elimination of a morpheme or word occurs, makes them more likely to be able to transfer the visual input into verbal output. The visual display

creates a more comprehensible activity for them than learning by being "told" via the auditory channel alone. Stories can be taped that use the specific tense that has been practiced. The child can be allowed to fill in the missing words or tense forms orally or by writing them down. This is but one variation upon the basic strategy of teaching the child to use a visual display, to recognize the regularity of the structures and word sequences, to predict what will come next, and to confirm if they were correct or if they need to self correct. Utilizing this format, reading, writing, and syntax therapy can be combined, each serving to enhance the development of the others.

But what of the young adults with Down's syndrome today who have "completed" their education and are currently working in competitive employment or in a sheltered workshop? What can be done for them? It is rare for these individuals to receive speech and language therapy past the age of 22 when their public education has been "completed" and they leave school. From then on, they must function the best they can using whatever skills they have acquired. Since they cannot be reached and included in new training programs at the current time, perhaps the focus should

be placed upon the education of the people they work for and with. These people should be taught how they can communicate optimally with individuals with Down's syndrome. They must learn that they must demonstrate all new techniques and sequences. A visual demonstration is considerably more important to individuals with Down's syndrome than the most detailed, careful, and patient explanation. In fact, the more detailed and careful the explanation, the more likely it is to be uncomprehendable. All directions should be given in short distinct phrases (accompanied by demonstrations whenever possible). To insure that instructions have been comprehended, asking for a repetition of the instruction rather than "do you understand?" should become a practice. A list of the words that should be completely eliminated when speaking with individuals with Down's syndrome, should be learned by every administrator and aide employed in sheltered workshops. All supervisors there should be made to understand that their workers most likely will not understand negative instructions (for example; "water the flowers that do not have buds."). These directions should be rephrased in a positive manner or given with examples. Words such as "neither, if, except, either, some, without, any, if,

or", as well as the temporal terms of "when, before and after", are words and concepts that should never be included in directions given to an individual with Down's syndrome. It is clear from this study that they are not comprehended. Unfortunately, when these terms are used, and the instruction is not appropriately completed, the worker is blamed for not "applying themselves", or not "listening to directions". It really is the supervisor who must be faulted for not using "appropriate understandable language and teaching techniques" for these individuals.

Recommendations for Future Research

Many recommendations have just been made for enhancing the auditory attention and memory skills of infants and children with Down's syndrome. It is obvious that they must be tested in order to ascertain if these procedures will indeed be valuable. Therapy programs must be written that are specific and well researched for different levels of abilities. Materials and documentation must be provided along with instruction and training. Controlled longitudinal studies would be an optimal way to

evaluate these programs. Reading and writing material utilizing subject matter that is age appropriate, and designed according to the formats described above, need to be developed. Pilot programs should be implemented and documented to determine the success of these programs both in enhancing reading and writing abilities as well as to evaluate gains made in the syntax development of the children involved.

The study just reported should be duplicated using additional subjects and different tests to determine if consistent and significant differences continue to exist when the performance of individuals with Down's syndrome and others are compared. The population could be expanded to include a wider variety of age levels. Comparisons should be made with youngsters designated as "learning disabled", "developmentally delayed", and the Down's syndrome group. Additional research utilizing techniques of language analysis and sentence elicitation is also necessary.

More basic research should be planned into solving the problem of why there appears to be a dominance of visual ability over auditory skills. Miranda and Fanz (1972) examined the "looking behavior" of infants at 34 weeks of age, and found

differences in the preferences of the Down's syndrome youngsters when compared with "normal" children of the same age. They hoped to relate this looking behavior to early perceptual-cognitive development, and perhaps find a relationship between it and intellectual potential. Hartley (1981), presented dichotic listening chores to children with Down's syndrome.

A comparison with normal children of matched chronological ages revealed that the Down's syndrome children "showed a left ear advantage while the non-retarded children showed a typical right ear advantage"(p. 268). The left ear advantage was found for single syllable common nouns. The results were discussed in terms of possible right hemispheric dominance for language processing in children with Down's syndrome. We do know from autopsy reports that the brain of the individual with Down's syndrome is structurally different from those of others. Ball and Nuttall (1980) described it as follows; "the brains at autopsy were consistent with the diagnosis of mongolism, all showing some foreshortening of the anteroposterior dimension, some smallness of cerebellar volume, and most particularly lack of complete eversion of the superior temporal gyri. Fixed brain weights were low." (p.463). Thus, processing

might occur according to a different sequence and in a different manner in these individuals. EEG studies comparing subjects might reveal valuable information concerning localization and the manner of processing utilized by these individuals.

Whatever the actual cause of this deficit, its existence must be accepted as a factor which is common to the Down's syndrome population. A sufficient number of researchers have investigated these patterns and have substantiated that they do exist. They can be identified through the administration of a variety of tests, and are consistent through a variety of cognitive levels. This study has demonstrated that on those tests which assess short term storage and retrieval abilities, individuals with Down's syndrome characteristically receive lower scores than on those tests which assess manual and repetitive skills. It also demonstrates that material that is practiced, structured, and familiar can be stored, retrieved and learned, by the Down's syndrome individual. It is now possible to answer the question posed at the initiation of this study; "in what ways are young adults who display Down's syndrome similar in their language and psycholinguistic abilities?".

It is also possible to consider the implications

of these findings for remediation and for working with youngsters. Research has identified some of their deficits and their strengths and they appear to be as characteristic of the Down's syndrome group as are their physical stigmas.

CONCLUSIONS

It must be noted that all the 35 individuals who participated in this study conformed to the pattern of strengths and limitations in language and psycholinguistic abilities already described. The knowledge that these deficits are so consistently seen in young adults evidencing Down's syndrome leads one to speculate about how to improve the system of remediation and education available to them. I have already made some suggestions for remediation. Clearly the educational systems which are responsible for providing the remediation and education of both current and future generations must be examined and appropriately restructured.

Currently very few states provide immediate educational support once the identification of a "special needs" infant has been made. This uninformed and irresponsibile behavior must change.

It is essential that every state mandate the State Department of Education to provide appropriate early childhood education and remediation services to infants with Down's syndrome. These services should be initiated upon the identification of Down's syndrome in any infant. Without this type of support valuable years are wasted during which deficits in abilities develop which can never be adequately remediated. With the appropriate intervention programs described in this study the wide gaps in abilities noted, might never develop.

The label "developmentally delayed" has been agreed upon by society as an adequate descriptor of the intellectual ability of a group of people. This same label can also be used to describe the laws of states which arbitrarily terminate the education of these individuals at the chronological age of 21 years. For many individuals identified as "developmentally delayed" age 21 might well constitute the approximate chronological age at which they have achieved the cognitive growth and prerequisite skills to begin to benefit from academic curriculum programs. To terminate their education at that point serves only to force them into a dependent role throughout their lives.

Currently there are more than 95,000 adults over the age of 22 who are classified as "developmentally disabled". The states and indeed the federal government have decreed that their education has been completed. No provision has been made for their continued intellectual development. The option to continue to educate ourselves throughout our lives is one which is valued by our society. For these people it is an option that does not exist since there are few if any programs available to them. Those that do exist are mainly inconsistent programs run by volunteers and agencies without adequate funding, materials, or skilled teaching methods. Not providing appropriate educational services and opportunities for these adults is a vast waste of human potential, as well as a denial of opportunities available to all other people in our country. Surely these adults also deserve and indeed require the opportunity to receive the appropriate relevant education that we all desire throughout life.

The benefits society will gain from their education cannot be denied.

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APPENDICES

APPENDIX A

LEXI-CALC ANALYSIS - EUNICE

TOKEN COUNT

(/) OMISSION

/A	15	27	
/AN	40		
/AND	3	5	
/AT	7	9	10
/DONE	7		
/FOR	17		
/IS	13		
/IT	26		
/IT'S	20		
/OF	39		
/OR	17		
/THE	24		
/THEFIRST	14		
/TO	5	24	24

TOTAL = 20

(#) FILLER

#UH	3	17	38	42

TOTAL = 4

(-) INCORRECT

-CHOPS-CHOP	15
-DOING-MAKING	3
-FROM-WITH	10
-GOT-HAVE	27
-IT'S-THAT'S	27
-OF-IS	28
-THE	28

TOTAL = 7

(^) NEGATION

^DON'T	8	24
^NO	41	
^NOT	43	

TOTAL = 4

LEXI-CALC ANALYSIS - EUNICE

MOTHER	41							
MUCH	26							
MY	21	28	41	43				
NO	26							
NUMBER	13	16	17					
OF	1	13						
OLD	43							
OLDEST	42	43						
ONE	4	5	5	10	13	13	14	16	27
ONLY	44							
OTHER	20							
OUR	22							
OWN	28							
PORK	15							
REGULAR	17							
REMEMBER	14	19	20					
RIGHT	4							
SANDWICH	27							
SCHOOL	40							
SCHOOL'S	22							
SEVEN	44							
SHE	45							
SHE'S	44							
SISTER	43							
SMALL	37							
SODA	39							
SOMETHING	1	6	11	38				
SPECIAL	15							
SPECIALS	13							
STUFF	18							
SUMMER	22							
THAT	11	25	38					
THAT'S	4	16	29					
THE	2	13	18	20	22	42	43	
THERE	4	5	23					
THEY	9	10	10	15	17			
THING	4	27						
THINK	1	20						
THIRTY	7	9	10	44	45			
TO	1	8	20					
TOO	20	26	43					
TUNA	3	38						
TWO	5	7	17	29				
WANT	39							
WASH	8							
WAY	25							
WHEN	10							
WHOLE	22							
WITH	21	41						
WORD	20							
WORK	2							
WORKING	40							
YES	12							
YOU	12	18	38	39	39			

LEXI-CALC ANALYSIS - EUNICE

WORD-COUNT

A	37	37													
AFTERWARDS	6														
AND	43														
ANY	39														
ANYTHING	8														
AT	40														
BACK	10	23													
BASKET	37														
BE	13	45													
CAN	12	38	39												
CAN'T	14	20													
CASSEROLE	38														
CHILI	17	17													
CLOSED	22														
COME	9														
CON'T	19														
COSTS	26														
COULD	45														
CUT	8														
DISH	37														
DOING	6														
DONE	10														
EASIER	25														
EGGSALAD	3														
EIGHT	45														
EITHER	43														
ELEVEN	9														
ELSE	6														
FISH	3	38													
GET	7	10													
GO	5	10	23	24											
GONNA	13														
GOT	1														
GOTTA	8														
HAM	27														
HARD	20														
HAVE	8	15	17	21	24	38	39								
HENRY	42														
HERE	5	24													
I	1	2	5	7	8	8	14	19	20	21	23	24	27	40	
I'M	3	6													
IN	2	9	37												
IS	42	43													
IT	8	19													
IT'S	25														
JOBS	5														
JUICE	28														
KIND	39														
KITCHEN	2														
KNOW	18														
LIKE	11	37	38												
LITTLE	37	37													
LUNCH	21														
LUNCHROOM	24														

1. I GOT TO THINK OF SOMETHING
2. I WORK IN THE KITCHEN
3. I'M -DOING-MAKING EGGSALAD /AND TUNA FISH #UH
4. THAT'S ONE THING RIGHT THERE
5. I GO /TO TWO JOBS ONE HERE /AND ONE THERE
6. I'M DOING SOMETHING ELSE AFTERWARDS
7. I GET /DONE /AT TWO THIRTY
8. I ^DON'T HAVE TO CUT ANYTHING I GOTTA WASH IT
9. THEY COME IN /AT ELEVEN THIRTY
10. WHEN THEY GET DONE -FROM-WITH ME THEY GO BACK /AT ONE THIRTY
11. SOMETHING LIKE THAT
12. YES YOU CAN
13. ONE OF THE SPECIALS /IS GONNA BE NUMBER ONE
14. I CAN'T REMEMBER /THEFIRST ONE
15. THEY HAVE /A PORK -CHOPS-CHOP SPECIAL
16. THAT'S NUMBER ONE
17. /FOR NUMBER TWO THEY HAVE #UH MEAT CHILI /OR REGULAR CHILI
18. YOU KNOW THE STUFF
19. I CBN'T REMEMBER IT
20. I CAN'T REMEMBER THE OTHER WORD /IT'S TOO HARD TO THINK
21. I HAVE MY LUNCH WITH ME
22. OUR SCHOOL'S CLOSED THE WHOLE SUMMER
23. I GO BACK THERE
24. I ^DON'T HAVE /TO GO /TO /THE LUNCHROOM HERE
25. IT'S EASIER THAT WAY
26. NO /IT COSTS TOO MUCH
27. I -GOT-HAVE /A HAM SANDWICH -IT'S-THAT'S ONE THING
28. -THE JUICE -OF-IS MY OWN
29. THAT'S TWO (THINGS)
30. THAT'S WHAT I HAVE IN MY HEAD
31. ^NOT YET
32. ^NOT TILL ELEVEN THIRTY
33. YOU CAN GET YOURSELF TOMATO SOUP
34. /THAT IS ONE
35. YOU CAN HAVE A TOSSED SALAD
36. YOU CAN HAVE A STEAK TO GO OR YOU CAN LEAVE (AND EAT IT)
37. IN A LITTLE SMALL DISH LIKE A LITTLE BASKET
38. YOU CAN HAVE TUNA FISH CASSEROLE #UH SOMETHING LIKE THAT
39. YOU CAN HAVE ANY KIND /OF SODA YOU WANT
40. I /AN WORKING AT SCHOOL
41. ^NO WITH MY MOTHER
42. HENRY IS THE #UH OLDEST
43. AND MY SISTER IS THE OLDEST ^NOT TOO OLD EITHER
44. SHE'S ONLY THIRTY SEVEN
45. SHE COULD BE THIRTY EIGHT

LEXI-CALC ANALYSIS - EUNICE

FINAL STATISTICS

NUMBER OF SENTENCES = 45

TOTAL NUMBER OF WORDS = 217

TOTAL NUMBER OF DIFFERENT WORDS = 120

TYPE-TOKEN RATIO = 1.808

MEAN LENGTH OF UTTERANCE = 4.577

TOTAL NUMBER OF TOKENS = 15

OMISSION	20	(NC)
ADDITION	0	(NC)
FILLER	4	(NC)
ATTENTION	0	(NC)
INCORRECT	7	
WRONG PLACE	0	
NEGATION	4	
PREFIX	0	
SUFFIX	0	
WRONG TENSE	0	
EXTRA1	0	
EXTRA2	0	
EXTRA3	0	
EXTRA4	0	
EXTRA5	0	

TOTAL = 35

(NC) - THESE TOKENS ARE NOT COUNTED IN TOTALS.

APPENDIX B

FINAL STATISTICS

SUBJECT # 1

	SPONTANEOUS	ELICITED
NUMBER OF SENTENCES	50	12
TOTAL NUMBER OF WORDS	200	65
NUMBER OF DIFFERENT WORDS	125	31
TYPE-TOKEN RATIO	2.096	1.6
MEAN LENGTH OF UTTERANCE	4.91	3.84
OMISSION	33	3
ADDITION	0	2
FILLER	0	0
ATTENTION	0	0
WRONG PLACE	0	1
NEGATION	0	4
WRONG TENSE	5	4
EXTRA 1		
EXTRA 2		

FINAL STATISTICS

SUBJECT # 2	SPONTANEOUS	ELICITED
NUMBER OF SENTENCES	50	15
TOTAL NUMBER OF WORDS	172	38
NUMBER OF DIFFERENT WORDS	116	28
TYPE-TOKEN RATIO	1.4	1.35
MEAN LENGTH OF UTTERANCE	2.26	3.10
OMISSION	51	5
ADDITION	2	0
FILLER	7	0
ATTENTION	0	0
WRONG PLACE	3	0
NEGATION	3	0
WRONG TENSE	4	0
EXTRA 1		
EXTRA 2		

FINAL STATISTICS

SUBJECT # 3	SPONTANEOUS	ELICITED
NUMBER OF SENTENCES	50	15
TOTAL NUMBER OF WORDS	246	87
NUMBER OF DIFFERENT WORDS	124	49
TYPE-TOKEN RATIO	1.98	1.77
MEAN LENGTH OF UTTERANCE	4.74	5.2
OMISSION	11	3
ADDITION	4	0
FILLER	6	0
ATTENTION	0	1
WRONG PLACE	0	0
NEGATION	0	2
WRONG TENSE	4	4
EXTRA 1		
EXTRA 2		

FINAL STATISTICS

SUBJECT # 5	SPONTANEOUS	ELICITED
NUMBER OF SENTENCES	50	15
TOTAL NUMBER OF WORDS	236	96
NUMBER OF DIFFERENT WORDS	124	51
TYPE-TOKEN RATIO	1.9	1.88
MEAN LENGTH OF UTTERANCE	4.54	5.93
OMISSION	14	4
ADDITION	4	0
FILLER	0	0
ATTENTION	0	0
WRONG PLACE	0	0
NEGATION	4	1
WRONG TENSE	6	6
EXTRA 1		
EXTRA 2		

FINAL STATISTICS

SUBJECT # 6	SPONTANEOUS	ELICITED
NUMBER OF SENTENCES	50	15
TOTAL NUMBER OF WORDS	254	104
NUMBER OF DIFFERENT WORDS	135	49
TYPE-TOKEN RATIO	1.8	2.1
MEAN LENGTH OF UTTERANCE	5.0	6.7
OMISSION	2	1
ADDITION	0	0
FILLER	2	0
ATTENTION	0	0
WRONG PLACE	0	0
NEGATION	4	1
WRONG TENSE	3	2
EXTRA 1		
EXTRA 2		

FINAL STATISTICS

SUBJECT # 7	SPONTANEOUS	ELICITED
NUMBER OF SENTENCES	49	15
TOTAL NUMBER OF WORDS	200	63
NUMBER OF DIFFERENT WORDS	125	35
TYPE-TOKEN RATIO	1.6	1.8
MEAN LENGTH OF UTTERANCE	3.9	3.8
OMISSION	33	2
ADDITION	0	0
FILLER	0	0
ATTENTION	0	0
WRONG PLACE	1	1
NEGATION	2	1
WRONG TENSE	5	3
EXTRA 1		
EXTRA 2		

FINAL STATISTICS

SUBJECT # 8	SPONTANEOUS	ELICITED
NUMBER OF SENTENCES	50	15
TOTAL NUMBER OF WORDS	256	93
NUMBER OF DIFFERENT WORDS	120	50
TYPE-TOKEN RATIO	2.13	1.86
MEAN LENGTH OF UTTERANCE	5.66	5.00
OMISSION	13	2
ADDITION	2	1
FILLER	0	0
ATTENTION	0	0
WRONG PLACE	0	0
NEGATION	1	3
WRONG TENSE	4	5
EXTRA 1		
EXTRA 2		

FINAL STATISTICS

SUBJECT # 9	SPONTANEOUS	ELICITED
NUMBER OF SENTENCES	48	14
TOTAL NUMBER OF WORDS	354	83
NUMBER OF DIFFERENT WORDS	182	44
TYPE-TOKEN RATIO	1.9	1.8
MEAN LENGTH OF UTTERANCE	7.2	5.6
OMISSION	13	3
ADDITION	2	1
FILLER	0	0
ATTENTION	0	0
WRONG PLACE	0	0
NEGATION	1	1
WRONG TENSE	4	3
EXTRA 1		
EXTRA 2		